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for the drilling-producing-pipeline industry

PETROLEUM REFINER and The REFINERY CATALOG
for the refining-natural gasoline industry

THE OIL WEEKLY

ENGINEERING • NEWS • STATISTICS

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LOOKING AHEAD
. . . with the Editor

WITH discovery of a small oil well in Florida, the petroleum industry is looking with considerable interest to the Southeastern States as a possible future oil province. Present interest is centered mainly on Florida and adjoining South Alabama and South Georgia, areas believed to offer more favorable conditions for oil and gas accumulations. Millions of acres of land have been leased in this region, and a number of wildcats are planned for 1944.

A forthcoming article will review the general geological conditions of Florida, and will list all the wells ever drilled in the state.

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The Changing Panorama

Supply of New Autos Nearly Exhausted

THE outlook for automobile transportation is now reaching a critical stage. Stocks of new cars are almost exhausted, and more automobiles are reaching the stage where it becomes almost a necessity to replace them.

Only 65,000 new automobiles remain out of 532,000 on hand when rationing was commenced in February, 1942. Withdrawal from stocks of new cars has been better than 22,000 per month since rationing started. With only 65,000 cars remaining in the pool, there would be approximately three months supply. A reduction of 50 percent will only give the nation a six-month supply of new automobiles.

Solution to the Reserve Problem

SINCE the proposition of a gentleman from Michigan, published in THE OIL WEEKLY some time back, to reduce the content of a barrel of crude oil from 42 to 32 gallons, and in that way add nearly 25 percent to the nation's reserves, has not been acted on by Washington, we have a counter proposal to make.

Appoint that well-known oil expert of the Army and the Canol project, General Somervell, as "Grand Chief Estimator and Reserve Builder Upper," and let him revise all present estimates on United States reserves. The general has done such an excellent job of raising the reserves at Fort Norman that we do not doubt that an estimate by him would allay all fears and estimate enough oil to last from here on out. The general's enthusiastic estimate on Fort Norman of 100,000,000 barrels, before a Senate committee, was in no whit affected by the wind taken out of his sails by a practical oil man, Senator Moore of Oklahoma, who crossed the army oil expert up no end by naming a score of 100,000,000-barrel fields when the general fixed the reserves at Fort Norman at that amount and indicated that it was the most important field discovered since East Texas. The general crawfished out of his estimate as to the comparative size of Fort Norman and some of the other fields, but he apparently still sticks to his 100,000,000-barrel estimate for the Canadian field. As a matter of fact, oil men who are more familiar with making of reserve estimates than anyone we have heard as being connected with Canol, place the Fort Norman reserve at less than a third of the 100,000,000 barrels named by the general.

From which, as well as the expenditure of money involved in the Canol project, it will be noted that the general is no piker. Using the Canol project basis of estimating, this country should have at least 60 billion barrels of proven oil (which is more than is now accredited to the entire world) and that would make it just dilly.

Does Government Want Wildcats?

CALIFORNIA oil men are telling a background story of wildcatting in an era of supposedly high incentives that seems to have some kind of a moral. It concerns the recent completion of an Inglewood field outpost brought in with a 3000-barrel initial that opened a new area of great possibilities. The story is that 21 months passed after the wildcatter made his application for a permit to drill the well before he obtained the government's approval.

Honeymoon Between Ickes and Oil Over

WHEN PIWC asked Ickes at its December meeting for an explanation of his ideas on government foreign oil policies, following publication of an article of his on this subject in the American Magazine, it marked the first flare-up between the industry and the petroleum administrator since his appointment back in June of 1941. However, oil men also have become alarmed over other remarks and acts of Ickes, as well as several persistent rumors, and these constitute smoldering embers about ready to break into open flame. These signposts indicate that the honeymoon between Ickes and the oil industry is about over, and that henceforth his actions may be viewed with suspicion.

On top of the industry's alarm over Ickes' plan to put Petroleum Reserves Corporation into foreign oil business, it is reported he is scheming to set up another government corporation to go into the domestic oil business. This agency, it is said, might engage in the drilling and production of oil on public lands, take over operations on Army and Navy reserves, and also build and operate synthetic petroleum plants, which Ickes in another recent magazine article said were necessary to avoid an oil shortage in this country. Furthermore, the rumor that Ickes wants to become "oil czar" after the war has been revived. A newspaper commentator last week declared Ickes was shooting for this goal, hoping oil companies would decide to collaborate more closely after the war and would select him czar at a $75,000 per year salary.

Despite their previous mistrust for Ickes, oil men rallied behind him after his appointment—because he proved a good administrator and avoided many pitfalls encountered by other government agencies, and because he professed belief in postwar private enterprise with a minimum of government control. While he still serves ably as an administrator and still gives lip service to private enterprise, his actions indicate he is ambitious to get the government into the oil business and keep it there. Oil men suspect he has been soft-soaping them.

California's Offshore Rights Threatened

CALIFORNIA oil company officials and state administrators are exhibiting alarm over the active interest on the part of the federal government in the possibility of "federal title" to California's offshore lands. The General Accounting Office, long regarded as the "watchdog of federal legislation," recently asked the Senate Public Lands Committee for copies of all hearings pertaining to that subject. Applications are pending in the General Land Office for federal drilling leases off the California coast, and efforts are underway to force federal court rulings as to ultimate ownership of the disputed properties, and to compel Secretary Ickes' office to grant leases.

Californians are standing pat on their states' rights, and a real battle seems to be brewing. It is quite possible that California may rush through appropriate legislation and steal a march on the federal government by setting up the machinery for issuing state leases for offshore drilling of structures not anchored on the shores. The right of possession would therefore prevail and would make the state's claims just that much more difficult to cast aside.

War Developments Presage New Era in Oil Transportation

Emergency has gendered a new era in movement of oil and economies have evolved even when costs were secondary, so that costs will be lowered when peace permits return to normal operation of pipe lines and ships

By A. R. McTEE, Staff Writer

OIL transportation in the United States during the past two years has startled the nation. Developments have been so swift that engineers, government officials, and the general public alike have been left doubting their eyes. They have seen accomplished what was said to be impossible. Time and space have literally been obliterated in linking sources of oil supply with points of demand. The feat of replacing tanker capacity with pipe lines has been achieved. The urgency of the situation has been met with a determination that matched it, and in less than two years from the time our oil transportation system was snapped in two by the submarine, it has been restored.

The use of railroads in the interim when neither pipe line nor tanker was available, was also phenomenal. Long tank trains rumbled ceaselessly toward the East day and night with right-of-way priority, and the oil got there. So well was the "know-how" applied, that all oil requirements for military needs were filled, and about 75 percent of civilian necessities, up to the time the Big-Inch pipe line was finished. Now, with better than 300,000 barrels of oil reaching the Atlantic Coast through this line, supplementing other methods of transportation, the problem of moving oil is prety well solved, domestically at least.

A new era of oil transportation has sprung from all this activity. Trends, some of which are already clear, have forced themselves to the top in this stream of development. In spite of the emergency under which they have originated, these trends are certain to persist when peace comes: Cost of moving oil will be revised downward, owing to progress that has been made, both in methods of handling oil and the equipment used.

Keener competition in both domestic and foreign oil is likely to result from greatly expanded facilities for handling.

World-wide extension of aviation routes will necessitate fuel supply bases and lines in many localities where none have been needed heretofore.

Great flexibility in oil transportation will be required to meet the demand for a better balanced world-wide supply that will follow naturally in the rehabilitation period after the war. Since oil is a prime source of power, it is bound to find its way into use in many parts of the world where it has not been known before. In fact, one of the jobs ahead for the industry is to promote the use of oil and its products in other nations. Undoubtedly in the period immediately following the close of the war, there will be extensive increases in the use of mechanical energy to replace human energy, with oil furnishing the power. Industrialization of China, for instance, such as is proposed by her leaders, will create a demand for petroleum as great as has been known up to this time. For as R. W. Gallagher, president of Standard Oil Company (New Jersey), said recently, "Before the farmer of China is told to throw away his hand-plow and climb into the driver's seat of a gasoline tractor, he must have the gasoline to run the tractor—and be able to pay for both the tractor and gasoline. Automobiles must have gasoline and oil—whether they skim over smooth American highways or bump along the mountain roads of Burma. Airplanes, trucks, buses, diesel-driven ships and locomotives are only so much weight of machinery until they are brought to life by the oil fuels which give them power."

These are a few of the pointers to the new era. Others are certain to appear as we progress toward peace, and afterward.

Building the Big-Inch and the 20-Inch Products lines from the southwest to the East are the major factors in the improved transportation system. When the war is won, these projects can be credited with having been decisive weapons in defeat of the Axis. Effects of these lines on post-war oil problems are unknown. However, an appraisal of the Big-Inch, by two prominent engineers, Wallace R. Finney and J. B. Adoue, in *Mining and Metallurgy*, for October, suggest a prominent influence on petroleum economics after the war. Answering their own question, "Is the Big-Inch a white elephant to be abandoned as another war project?" they say definitely, "No."

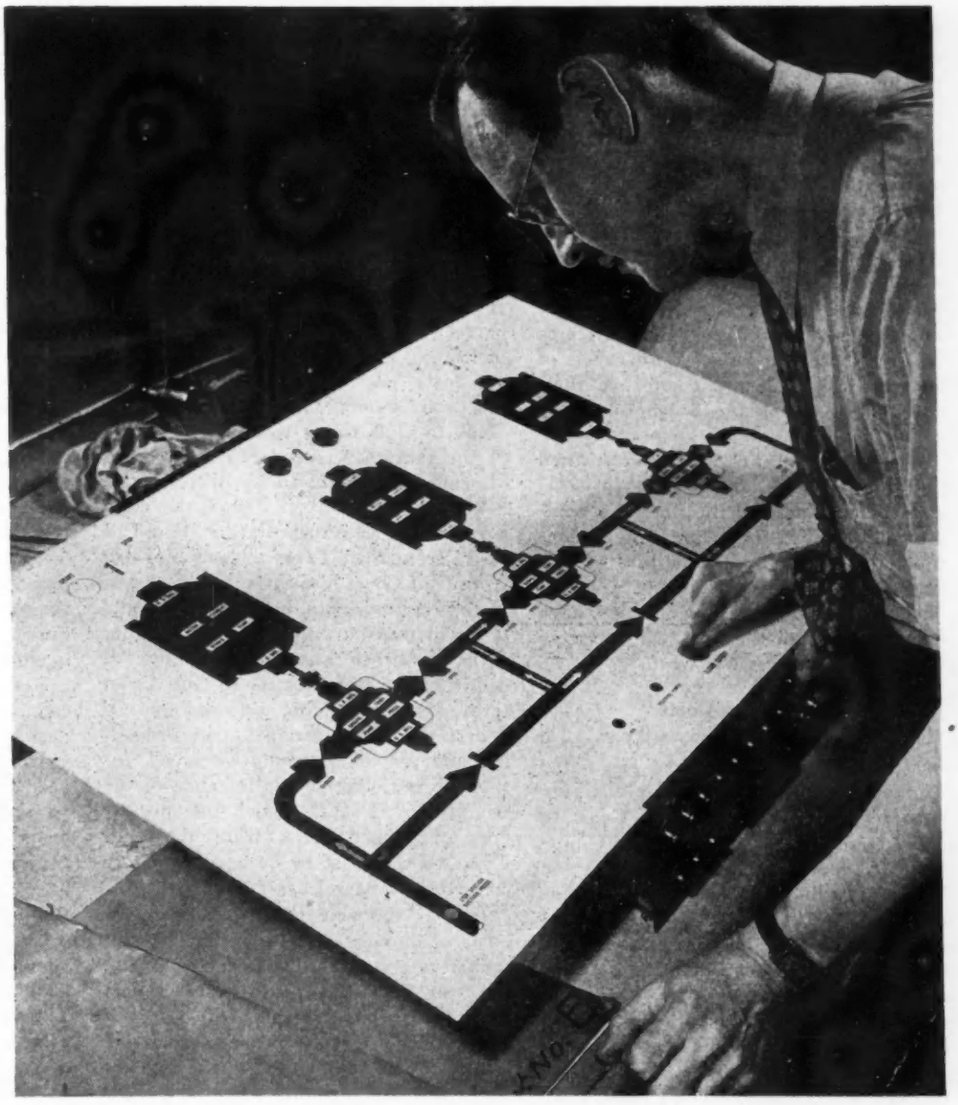
A good many people in the industry have asked themselves the same question, but have not been able to reach an answer as quickly or as decisively as the authors mentioned.

The cost of moving oil through the Big-Inch is, of course the reason cited by these two experts for their conclusion. At 15.2 cents per barrel, this figure is the lowest in the history of pipe-line operations. Never before has it even been approached, according to these two writers, and they prophesy "A new era of pipe-line activities is clearly in sight."

It has been pointed out by people who are uncertain about the influence of Big-Inch on post-war problems, that this low cost per barrel cannot be maintained unless the lines are operated day and night at capacity, and about 4,000,000 barrels of working stocks are required just to operate the Big-Inch. With declining reserves and exploration results below the level to keep reserves up, the question of supply to keep the lines in operation naturally arises.

When the war pipe-line-expansion program is completed, there will be more than 8000 miles of new and reconditioned oil and gas lines that have gone into use since Pearl Harbor. Total capacity of the oil and products lines will be beyond 750,000 barrels, or about 40 percent of prewar tanker crude.

Some of the advantages of the Big-Inch presage future pipe-line developments which may further affect the cost of moving oil. Remarkable decrease in



Working model of the electrical control desk for the 20-inch products line. Each desk top will have a diagram like the one illustrated. These desks will keep a constant check on the pressure of the line and on the operation of electric motors, pumps and valves in the station.

—Photo Courtesy Westinghouse.

operating cost achieved through the use of large diameter which lowers the original investment per barrel of oil, probably means that in future lines the tendency will be toward pipe sizes ranging from 16 to 24 inches in diameter. Longer joints welded together probably will be used. Improved techniques in welding resulting from such extensive application of welding in war plants may have some influence on pipe-line construction. Lines in the future probably will be placed several feet below the ground as an aid in maintaining more constant temperatures and avoiding damage from sudden and drastic weather changes. Further development in technique of protection against external corrosion may be expected, as well as additional development and extension of cathodic protection. Pipe walls are likely to be thinner. Safety factors will be lower.

Further extension of automatic control in also a certainty. Notable steps are already being made in this respect. On the new 20-inch products line new electric control desks are being installed that take the temperature of motors, pumps and bearings, check the pressure in the pipe and show the station operator through what pipes fuel is flowing. Detailed descriptions of this equipment is warranted because of its accomplishments.

The desk is about eight feet long with a semi-transparent plastic top section on which is imprinted the diagram of the station showing each motor, pump, valve and pipe. Underneath the plastic are 60 tiny electric lamps colored red, amber or green, and a maze of wires connecting the lamps to valves, thermometers and sensitive pressure gauges located at strategic points in the station piping, in motors and bearings.

A glance at the diagram tells the station operator what valves are open or closed. Illuminated arrows on the plastic show him the route the oil is taking through the station's pipes.

If one of the three pumps in the station develops an abnomal temperature or pressure, a tiny red lamp flashes on to show the trouble spot on the diagram. The same thermostat or pressure relay that flicked on the tell-tale lamp sends into action protection devices that automatically stop the motor and close the valves leading into the pump, causing other valves to open, re-routing the fuel around the idle unit.

The desk fits into a control room window that permits the operator to view other rooms, one for the motors and one for the pumps. The motor shafts extend through a firewall that prevents gasoline or oil from invading the motor room.

A cooling fan on each motor draws air over the motor parts and expels the heat through the station roof. The control room that contains circuit breakers and other electrical switching apparatus, is kept under pressure of fresh air forced in from the outside to shut out fumes from the pump room. This provides atmospheric conditions in the control room that are safe even in the presence of an electric arc.

Thus by the push of an electric but-

ton an operator can control the flow of millions of gallons of gasoline through the line.

Some progress has been made in increasing deliveries through old lines, whereby capacities have been boosted as much as from 25 to 50 percent. This has been done through the use of higher operating pressures, more efficient pump-station practices, and removal of bottlenecks in the systems. Faced with competition from the new lines, operators of these older systems will be forced to closer observance of all practices that might improve their throughput of oil and lower operating costs.

Disposition of the government-owned pipe lines has already become an issue, even before some of the lines are completed. Whether these lines might continue to operate as competitors of private lines has caused concern. A group of Midwest producers, for instance, have been fearful that the lines will interfere with older lines farther west.

Pipe Line Costs

The Petroleum Industry War Council is studying the problem and has noted comparative prewar rates for carrying a barrel of oil from the Gulf Coast to New Jersey were: railroad, $2.20; pipe line, 76 cents; tanker, 20 cents, and barges variable on account of winter tie-ups.

Supporting their acclaim of a new era in pipe-line activities, Finney and Adoue cite the following costs today, of moving oil from the Gulf Coast to the Eastern Seaboard: Big Inch, 15.2 cents per barrel; by railroad, $1.46 per barrel; and through small diameter pipe lines, 67½ cents per barrel.

The suggestion has been made that the lines be turned over to the petroleum industry. A major factor, however, affecting the industry's interest in them will be the government's attitude on price.

Another alternative, conversion of the lines to natural-gas carriers, has been proposed.

Integration of pipe-line facilities was recommended by the National Resources Planning Board in its last report on post-war transition to a peacetime economy. Specifically, the board outlined creation of a federal transportation agency to work with pipe-line companies, or possibly through a corporation devised to act for the companies, and carry out and expand the network of major lines with a view to insuring a supply of oil in future emergencies. Also, some congressmen have advised for this same purpose, accumulations of strategic materials and retaining in stand-by condition, facilities that have had to be built in this crisis.

From within and without the petroleum industry has come the suggestion that one of the big lines might be converted to a natural gas line, while the other could be used to move foreign oil to Mid-Western refineries.

If the lines continue to operate after the war, they are sure to remain as competitors with tankers. As pointed out by Finney and Adoue, "The major competition to the Big-Inch is transportation via tankers, the cost of which from the Gulf Coast terminals to New Jersey is approximately 10.4 cents per barrel. To this must be added the cost of loading and unloading, that is, terminal costs, as well as the cost of pipeline movements from the producing fields to Gulf Coast terminals. In view of the fact that considerable quantities of crude for the Big-Inch will come from fields other than East Texas, the comparable cost in transportation should be based from East Texas to New York or from Gulf Coast terminals to New York, as an approximate equal cost would occur in transportation from such other fields to either East Texas, points of origin of the Big-Inch, or to Gulf Coast terminals for loading on tankers. Of course the water terminal costs in loading and unloading would be saved, for they do not exist in the instance of the Big Inch." PIWC found the prewar cost of tanker hauls from the Gulf Coast to the East to be approximately 20 cents per barrel.

Just as the new era forecasts lower costs of moving oil by pipe line, so will tanker rates tend to be lower following the war. For the largest tanker fleet this country has ever had will be ready for civilian use when peace is declared. One estimate, allowing for 150 tankers sunk by submarines, states that 750 post-war tankers will be available.

United States Maritime Commission figures are so affected by the progress of the war and other factors that revision may be necessary. As the schedule now stands, however, the commission contemplates construction of 247 large tankers and 32 coastal tankers in 1944, in addition to five conversions of Liberty ships to tankers. Delivery of ocean-going tankers in 1942 included 62, and through October of this year, 126 large tankers, 25 coastal tankers, and 27 Liberty ship conversions, making a grand total of 524 oil-hauling vessels delivered to the commission by the end of next year. These new craft are bigger and faster than the old, and point undoubtedly to a drop in the average barrel transport rate.

Even before the war tankers had a monopoly on long hauls, and with their improvement and increased availability they will be in a better position than ever when the war ends.

A complete preview of postwar tankers is not possible because information is limited with so many important developments being held as miiltary secrets. Manufacturers assure, however, that ship for ship the new tankers will carry more cargo than pre-war vessels. They will be faster and safer. The weight per horsepower of their propulsion equipment will be less, and so will their fuel consumption.

Ship Power Plants

Some achievements from war-production experience in the manufacture of propulsion equipment affecting tankers include: Packaged power plants for prefabricated ships. Prefabrication methods are being used in the production of propelling plants. For example, in one large shipbuilding program involving several hundred units, the main condenser provides the foundation for a turbine generator. This combination can then be handled as a single unit which is lowered into place and aligned on a prepared foundation within a few hours. Propulsion motors are assembled with their coolers and handled in a similar manner.

New fields of application for turbine-electric drive is indicated by radical changes in these power units. Weight, space, and efficiency considerations have been foremost in the changes of design. In one instance, the turbine-generators operate at 5600 revolutions per minute, equivalent to 93.3 cycles. These units have a rating that is applicable to many ships during peacetime.

For the first time in history, repetitive manufacturing methods have been applied to 30,000-horsepower turbines. Through standardized designs and manufacturing methods, these turbines are now being produced at six times any previous rate, and at an appreciable saving. Such methods when applied to peacetime production will result in substantial cost reductions and greatly improved products.

When the war is over, the skill and experience, the improved methods of manufacture, and the host of new developments that have come from the war construction program will insure marine equipment superior to anything built before the war. When the industry can make plans for the future and think about modernizing its tanker fleet, undoubtedly it will want to take advantage of what has happened in the field of propulsion equipment during the war.

Certain fundamental engine requirements of the marine diesel of the future can already be predicted. Speaking before a recent meeting of marine engineers and architects, in New York, Gordon Lefebvre, president and general manager of The Cooper-Bessemer Corporation, analyzed the trend in marine diesel design and construction and discussed the major uses expected in the post-war period. He said that the marine diesel of the future must be built

in less weight, must require less space, and must be provided at a lower first cost.

Lighter Engines

Among other important factors, he stated that the greatest stride in the reduction of weight and space has been made by an increase of rotative speed and by the employment of higher ratings, particularly through super-charging; and that this type of engine has already fully demonstrated its reliability. "The engine builder fully recognizes the limitation of propeller speeds," he commented, "and it is realized that in order to make any use of the higher-speed engines now so fully developed, some means must be provided for connecting such an engine to the propeller, more notably by the use of reduction gears, but also by means of electric drives.

"Unfortunately the gear drive in general has been considered none too practical without the use of some form of slip coupling. With the slip coupling added to the gear it has been a disappointing realization that in many cases the weight of the high-speed engine, together with its coupling and gear, or the weight of the high-speed engine together with its electric drive, may be as great as the weight of the slow-speed engine direct-connected to its propeller, and the cost comparison is no better. It is true that more recently some gear developments have shown considerable progress toward less weight and less space. It is feared, however, that the gear, at least in the form we know today, will continue to be handicapped by the necessity of some form of slip coupling.

"It is of course fully recognized," he added, "that there are many reasons for electric drive, other than to employ the higher-speed engine, but it is merely pointed out that there is little, if any, weight reduction afforded. It is generally acknowledged that this transmission problem is one of the most vital at the present stage of development. There are a number of developments under way at present, each of which attempts to overcome the shortcomings of past performance, and it is quite probable that out of these developments we may arrive at a satisfactory solution.

Among the greatest strides in operating costs of diesels, according to Lefebvre, has been the development of engines to handle heavy, less expensive fuels, such as Bunker C. The trend toward higher speeds and ratings will not be hampered by a necessity of burning Bunker C or similar heavy fuels. Already engines have been developed which will operate even at 1000 rpm and at high super-charged ratings while handling heavy bunker fuels.

Diesel manufacturers are making more progress during the war than ever before, toward new and broader marine service in the application of diesels, and also in engine construction and the development of new operational features.

There have also been developments in steam turbines to make application of them as modern as the latest ship on which they are installed.

In the field of steam-turbine lubrication, a new oil has been developed, said to be the first lubricant to meet all requirements of modern steam turbine lubrication.

Stainless steel buckets are helping make turbine units more efficient also. For years, the difficulty of finding a metal that could withstand the corrosive action of the high temperatures of superheated steam at one end of the cycle and the erosive action of wet steam, or droplets of condensed water at the other, was a foremost problem in turbine construction. Then engineers developed buckets of stainless steel. For particularly severe service the buckets are often shielded with a cobalt-chromium-tungsten alloy. Stainless steel has high strength and toughness at elevated temperatures and also good resistance to corrosion and erosion.

Corrosion of marine equipment is the subject of an extensive study being carried on at a large chemical plant on the Atlantic Coast of North Carolina. This venture is completely described by F. L. LaQue, of the Development & Research Division, The International Nickel Company, in a recent publication. In summary, he says: "What beyond doubt is one of the most comprehensive studies of corrosion by salt water and sea air ever attempted on a practical scale has been under way now for over eight years. With the cooperation of leading producers of metals and alloys, this study has involved 15,000 specimens to date. This number is being added to constantly. Data regularly are being exchanged by those participating in the project. The study is continual and its scope is widening as more and more new information accumulates to serve the interests of metal producers and users." This proving ground is constantly helping improve marine equipment that goes into tankers.

Development of new metals is likely to affect tanker construction. Higher pressures and temperatures through the use of new alloys can be expected, with resulting lower fuel consumption to generate power.

Use of lighter metals is being accelerated by this war. Development of facilities for production of great tonnages of aluminum and magnesium may bring some interesting changes in machinery design, engines, motors, and turbines, for instance, within the next few years. Cost of these metals will be low and production capacities high. Magnesium is certain to increase in peacetime importance as we learn more about its properties, resulting in the use of magnesium alloys in ways we do not now imagine.

With the gas turbine now well past the experimental stage, the next logical step is its application to ships and other forms of transportation. This coming development is heralded as the truly forthcoming revolution in motive power —as far reaching in its influence as the invention of the steam turbine, the diesel engine, and even possibly the steam engine.

New Power Medium

Reader's Digest recently printed a discussion of this new power medium, "not an inventor's dream, or something in blueprint stage," but as an accomplished reality. "The gas turbine has arrived," it stated. A check on the number now in use showed 27 units in the United States, which can be mentioned under wartime censorship. There are said to be many which cannot. "A power plant for ships which drastically reduces weight, eliminates the fresh-water problem (five pounds of water for every pound of coal) and does away with the vast bulk of steam boilers opens a new horizon for ship designers."

Some large installations of gas turbines are already operating with the efficiency of the diesel, or better, and with troubles eliminated, there is a prospect that their use may become more popular than even the diesel.

The gas turbine is similar to the steam turbine except that there is no boiler. It is a generator and turbine combined. Combustion takes place near the turbine intake, and the entire stream of combustion products is used to drive the turbine motor. The entire unit is almost as simple as the principle it uses. Fuel which may be oil, natural gas, or by-products gas, is blown by compressed air through a burner much like the domestic oil burner. Compressed air and the combustion gases, expanding mightily in the intense heat, spin the turbine. The power of the spinning shaft can either be harnessed direct to machinery or used to generate electricity.

Use of new war-born metals, permitting temperatures up to 1700 degrees in the construction of a gas turbine, engineers say, could double its efficiency. The new metals will enable the turbine to operate at much higher inlet-gas temperatures than have yet been attained.

The gas turbine promises great compactness. It is estimated, for example, that a unit capable of 6000 horsepower could be included in one car (train) only slightly longer than a diesel car producing 2000 horsepower.

Plastic plugging job underway at East Texas well site. Bailer has been charged with plastic liquid and is being spotted in hole.

Plastic Plugging Is Ingenious Innovation for Shut-Offs

By DON L. CARROLL, Staff Writer

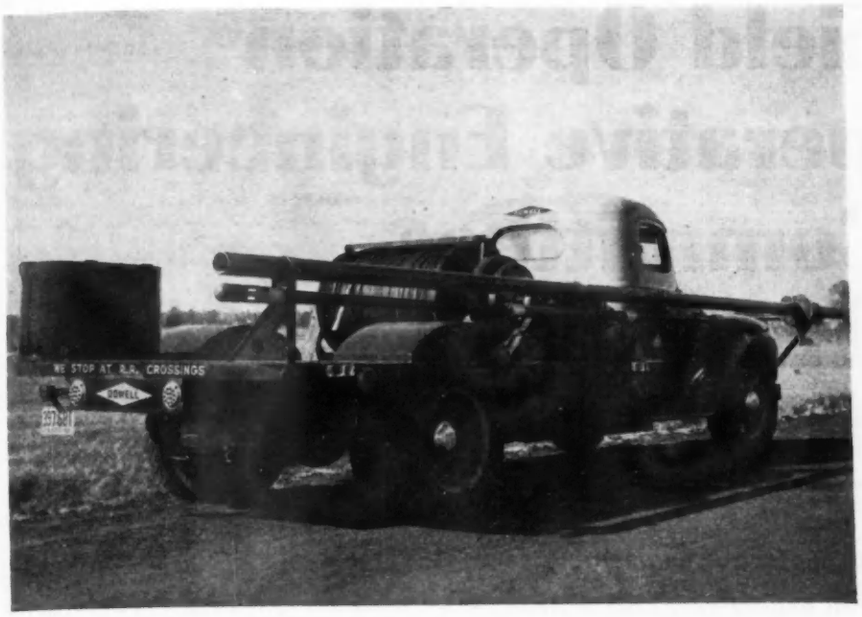
AFTER nearly a year of field trials and careful checking of results, a cheap and quick method of making bottom-hole plugs and shutting off higher gas and water zones — using a special thermo-setting plastic resin as the sealing material has been developed. Equipment of special design is employed in the handling and placing of the plastic, the spotting of which can be controlled within a vertical range of no more than 6 inches, according to electric log checks of a number of completed jobs.

This newest innovation in plugging techniques was developed and perfected wholly in the East Texas area, where nearly 200 plastic plugging jobs have been performed with notably successful results on 48 separately owned properties. The job records show 66 percent to have been completely successful, and 20 percent partially successful in improving well performances within a matter of only a few hours. The company is now offering the same service on a limited scale to operators in the Texas and Louisiana Gulf Coast region. The difficulty of securing necessary equipment and trained personnel is holding back any wider application of the technique at the present time.

It has been demonstrated that plastic plugging is effective not only in open holes, but also where liners and perforated pipe installations are present in trouble zones, since the plastic is introduced in liquid form, under pressure, and penetrates with all the facility of crude oil itself. Salt water and oil do not dilute it or affect it in any manner. Neither does it change in volume during the setting period. It makes a tight bond against steel, cement or any kind of rock formation, as proved by bottom-hole and laboratory tests. After setting, it remains chemically inert and rigid for an indefinite time, exhibiting essentially the same characteristics and properties as bakelite.

In bottom-hole plugging-back, to shut off water, the plastic is dumped from a special bailer that is equipped with a trigger valve which opens upon reaching the bottom. Adequate pressure for inducing penetration of the plastic into the formation is supplied by the weight of a column of water above the bailer in the hole. The height of the water column is controlled according to the requirements of each specific job and the amount of penetration desired.

The plastic is prepared in such a way that it remains in liquid condition at ordinary temperatures, but changes to a non-elastic solid when heated. The necessary heat for this change is provided by the temperature at the plugging depth. The higher the temperature, the shorter is the setting time. In wells



Complete plastic plugging unit mounted on single truck, showing 30-gallon tank of plastic, wire line reel, special dumping bailer and packer.

plugged with plastic at the East Texas field, bottom-hole temperatures averaged approximately 145°, and the setting time averaged 12 hours. More recently, plastic plugging in the South Houston field has been done with bottom-hole temperatures at approximately 150°, and setting time was found to be slightly more than 11 hours. It is estimated that at 200° the setting time would be no more than 2 or 3 hours, on the basis of field and laboratory experience.

After computing the correct plugged-back depth desired, the plastic is dumped at the bottom in an amount estimated to be sufficient for the proper fill-up. After the lapse of sufficient time for setting, depth is checked for fill-up; and if more plug is found to be needed the process is repeated. A meter is used on the wire line for accurate measurement of depth while running in, dumping, and withdrawing the bailer from the hole. The bailer selected for this work holds 10 gallons of the plastic. This size was found to be most suitable and most easily handled.

Viscosity of the liquid plastic, as delivered at the well, varies according to weather conditions, but at normal temperatures between 60 and 70 degrees it has about the same viscosity as SAE 30 motor oil.

It is obvious that one of the most important properties of the plastic material is its ability to penetrate rock formations and reduce their permeabilities to zero. In the laboratory it has been found that it will penetrate all the way through 1-inch Woodbine cores as quickly as crude oil under pressure. The actual rate of penetration at specified pressures has not yet been established; but volume penetration, under average conditions, is known to be approximately 25 percent of the amount of plastic used.

After hardening, the plastic possesses a tensile strength of 240 pounds per square inch, and a compressive strength of 1800 pounds per square inch. These initial strengths are retained permanently.

The plastic has been used successfully to seal off formations at various levels above producing zones, where water or gas flows may be causing trouble. On such jobs the plug is placed by feeding the plastic through tubing and a bridger, usually a standard retainer, placed below the water or gas influx zone. The solid plug thus formed can be drilled through after it has hardened. A water drive is used, as in the case of bottom plug-backs. If the trouble zone is near the top of the hole, a water column alone may not furnish enough pressure for good penetration. Therefore, additional pressure is built up by hooking on a pump at the surface.

Plastic plugging is controllable to such a fine degree that success has been attained on as little as 3 feet of exposed formation section, shutting off water that had been entering the hole from only a few inches of the rock wall. Only one or two gallons of plugging material have been used on some of these small scale shut-offs. On the other hand, more than 30 gallons have frequently been used on bigger jobs.

Cost of a normal plastic plugging job is approximately $300.00, including the use of up to 30 gallons of plastic. Extra costs, for electric logs that may be requested, and for special tubing crews or materials, may amount to perhaps $600.00 more. A complete job, then, properly performed, costs the operator $800 or $900.

Work is under way to determine the utility of other types of plastics for well plugging use, and their setting temperature ranges under varying viscosity ratings and different sand conditions. Progress in cutting down the length of setting time is also being made. It has been found that certain catalysts may possibly be added to control the initiation of setting, delaying it until the desired penetration is secured. This development would overcome the limiting factor of rock temperature to a considerable extent.

With all the new plastics that will be made available for industrial applications after the war, the oil operator can look forward to many interesting developments that will go a long way toward solving some problems of well completion. New types of selective completions are undoubtedly in the books for oil field application; and squeeze jobs may very well be the next innovation in the use of plastics in oil wells.

Plastic Plugging—East Texas Field, August, 1943

	Gallons Plastic	Before		After		Plug Length, Feet	Pay Open Feet
		Percent Water	Percent Oil	Percent Water	Percent Oil		
1	13.5	17	73	0	100	11.5	4
2	22	15	85	0	100	9	
3	15.5	90	10	35	65	9	1
4	28	23	77	0	100	18	47
5	23	50	50	12	88	14	14
6	10.5	10	90	0	100	7.5	3.5
7	24	35	65	0	100	13.5	1.5
8	35	38	62	0	100	12	1.5
9	13	98	2	70	30	6	5
10	9	50	50	0	100	5	4.5

Acknowledgments

This article is largely based on information presented in a paper by J. E. Bailey and Charles E. Dimit: "Plug-Back Work With Plastics In The East Texas Field", read at the September 22 meeting of the East Texas chapter of the American Petroleum Institute, Division of Production. Suggestions and criticisms of J. B. Stone, W. Doyle Miller, and others, of Dowell Incorporated, are gratefully acknowledged.

Oil Field Operation With Cooperative Engineering Committees

By V. E. COTTINGHAM, Chairman
North Basin Pools Engineering Committee

Before Interstate Oil Compact Commission, Wichita, Kansas, December 10, 1943

An important function of the cooperative engineering committee is compilation of general engineering and statistical data for the field as a unit. Through the committee's reports the individual operator may see the relationship of his lease to all leases in the field, which is essential in carrying out the modern conception of efficient development which involves orderly withdrawal from the individual well and from the reservoir. Cost of this cooperative effort has proven remarkably low.

V. E. COTTINGHAM

A GREAT deal has been said about the unitization of oil pools. This subject implies the voluntary unifying of ownerships, which may include not only the leasehold interests, but may also include royalty interests. Under unit operation the oil pool, as distinguished from the individual lease, becomes the unit of operation. The engineering and statistical data for this type of operation are assembled and compiled by a single organization for the field as a whole. The completeness of these data and the beneficial use to which it is put depends on the unit operator.

The benefits of cooperative unitization are considered by most engineers to be in the interest of both economy and a greater ultimate recovery. The question naturally arises as to why there are so few unitized oil fields. (Texas has only one.) Where there is a large diversified ownership, it may be quite easy to devise a unit plan of operation down to the point where the division of interests are considered. At this point the human equation enters the picture. This human factor is largely responsible for there being so few voluntary unitized oil fields. In my opinion, present-day knowledge of underground values is not certain enough to justify complete compulsory pooling. Even though unitization may be admitted to be a good thing in general, companies and individuals alike have been reluctant to relinquish operating control of their properties to someone else.

However, there is another type of voluntary cooperative work being carried on by oil producers through engineering committees. In those fields in which cooperative engineering committees operate, the engineering and statistical data are assembled and compiled for the field as a unit. The completeness of the data depends on the policy of the participating operators, and the beneficial use to which the data is put depends largely on the individual producer.

Very little has been said concerning this kind of cooperative enterprise. There are seven cooperative engineering committees or associations in Texas. While this number is not large, they are operative in fields which contain approximately 50 percent of the estimated oil reserve of the state. All of the oil fields of New Mexico are served by a single engineering committee. However, the strictly engineering work is confined principally to the 29 fields in Lea County. I have not made any attempt to acquire data on engineering committees in oil fields of any other states.

Engineering Committees in General

The duties of cooperative engineering committees, or operators associations, consist of acquiring, assembling, and compiling engineering and statistical data into report form for the oil field as a whole. The work of each committee is carried on under the direction of someone usually designated as chairman, but the organization and plan of operation of the various committees differ in three general respects:

1. The operators of a field secure the services of an engineer who is designated as chairman or field engineer. In this capacity, he collaborates with the company engineers in acquiring engineering data for the field as a unit. The

chairman's salary and expense incident to doing part of the engineering work and preparing reports are prorated on an equitable basis among the participating members. The Yates Pool Engineering Committee operates under this plan of organization.

2. The company engineers of a field organize themselves into an engineering committee and designates one of their members as chairman. None of these engineers receive special compensation, but the expense incident to preparing reports for the field as a unit is prorated among the sponsors of the committee. The Judkins Pool Engineering Committee operates under this plan of organization.

3. The operators of a field organize themselves into an engineering committee composed of an operators' committee, a full-time paid chairman, a treasurer-secretary and an advisory committee. The chairman's duties consist of organizing, supervising, managing and maintaining a competent staff, facilities and equipment required to carry on the program of the operators' committee. The salaries of committee employees, cost of equipment and other expense incident to the committee's work is prorated among the participating members in proportion to their respective pipe-line runs. The North Basin Pools Engineering Committee operates under this plan of organization.

Yates Field

The first engineering committee was a product of necessity. Like many other innovations in the oil industry, it was a necessary adjunct to proration. The Yates field was the first field in Texas to introduce voluntary proration. To carry on this work, it became apparent that there should be some agency responsible for acquiring, assembling, compiling and correlating the engineering and statistical data for the field as a unit, upon which to base agreements among the operators. The Yates Pool Engineering Committee was organized in 1928 for that purpose. It was the first engineering committee organized in Texas, and perhaps the first in the nation.

The engineering data acquired by the Yates Pool Engineering Committee has been made available to the Railroad Commission of Texas prior to and after the adoption of the first valid proration order in Texas. In my opinion, this oil regulatory body has used this data extremely well in regulating the withdrawals from the Yates field reservoir. Data from this source shows conclusively that the field is of the combination drive type, i.e., both the expanding force of a gas cap and the force of water drive are active agents present for displacing oil from the reservoir to the bore of the wells.

The Yates field has been produced, however, by employing the more efficient of these displacing agents, namely, the force of water drive, which in reality is natural water flooding as distinguished from artificial water flooding. For the 8 years preceding January 1, 1943, the average reservoir pressure declined only 8.1 pounds per square inch while producing 71,544,489 barrels of oil, or a decline of only 0.113 of a pound per million barrels produced. The field was 17 years old October 29, 1943, at which time 91 percent of the 562 wells producing from the main limestone reservoir were still flowing.

The Yates Pool Engineering Committee through this long period of years has furnished the operators with comprehensive reports on the field each year. These reports contain such engineering and statistical data as the production of oil, water, and gas; reservoir pressure distribution; contraction and expansion of gas-cap areas; reservoir displacement, and recommendations for prevention of physical waste by various corrective workover operations.

East Texas Field

The history of cooperative oil field engineering would not be complete unless it touched upon some of the early trials of proration in the East Texas field. Some solution had to be worked out to keep the oil in the ground which was not currently needed. In order to prevent the tremendous waste which was a grave potentiality, the final solution was that both surface and underground waste were greatly minimized by sound engineering principles.

Proration troubles in 1930, the year the East Texas field was discovered, became insignificant when compared with those of 1931 and 1932. The Railroad Commission of Texas held many heated hearings and received much testimony. During these years a multitude of theories were advanced to explain the mechanism of reservoir changes due to withdrawals from the Woodbine producing formation containing oil, gas, and water. At that time the knowledge of the factors and the physical laws governing the production of oil were comparatively new. Many good ideas were in the experimental stages, but both the public and the courts were reluctant to put them into effect.

Fortunately, during the early years in the history of the East Texas field, a mass of reliable data was obtained for the field as a whole by the cooperative work of a number of company engineers. In July, 1931, these engineers[1] started taking bottom-hole-pressure determinations at regular intervals on a selected group of key wells. Soon thereafter B. E. Lindsley[2] and other engineers with the Bureau of Mines, and a group of company engineers, with the aid of a bottom-hole sampler, started a study of the physical characteristics of the oil and gas solution as it actually existed in the reservoir. From the results of these and other studies, the principles of water drive, or natural water flooding, were definitely proven for the East Texas field. From these early efforts, the value of cooperative oil-field engineering became apparent and resulted in the organization of the East Texas Engineering Association in 1933.

The oil industry and the nation should be profoundly grateful to this group of East Texas engineers who pointed the way to real conservation through their cooperative efforts. They furnished sound engineering principles upon which the Railroad Commission of Texas could and did predicate orders to prevent both surface and underground waste on a scale the world has never known. Students of reservoir behavior estimate that where water drive is effective, the ultimate production will be more than 25 percent greater if water, rather than gas, displaces the oil from the reservoir.

Since June 10, 1933, which was shortly after the courts upheld the first valid proration order in Texas, the Railroad Commission of Texas also has had its own engineers make monthly bottom-hole-pressure determinations on a selected group of key wells in the East Texas field. From this bottom-hole-pressure data, the rates of production have been set month by month so as to permit an influx of Woodbine water into the oil reservoir in an amount to almost equal the space voided by oil, gas, and water withdrawals. In this manner the reservoir pressure has been controlled by natural water flooding. More recently the reservoir-pressure decline has been further arrested by the injection back into the reservoir of Woodbine water produced incident to oil production. For the 10-year period from June 10, 1933, to June 10, 1943, the pressure decline in the East Texas field reservoir has been from 1240.00 pounds per square inch to 1016.21 pounds per square inch. During this period the production totaled 1,496,895,048 barrels with a pressure drop of only 0.15 of a pound per square inch per million barrels produced. The cumulative oil production as of November 1, 1943, was 1,804,206,390 barrels on which date there were 25,152 wells, 68 percent of which were flowing.

Conroe Field

The Conroe field, located in Montgomery County, Texas, was discovered

[1] C. E. Reistle, Jr., "Effect of Different Production Rates on Pressure Distribution in East Texas," Fifteenth Annual Meeting API, at Dallas, Texas, November 15, 1934.

[2] B. E. Lindsley, "A Study of Bottom-Hole Samples of East Texas Crude Oil," Bur. Mines Rept. Investigation 3212 (1933).

December 13, 1931. After 11 years of productive history, it stands out preeminently as a model of achievement in cooperative oil and gas conservation work. Pursuant to engineering testimony, the Railroad Commission of Texas adopted a spacing program of one well to 20 acres, September 19, 1932. Wide spacing alone could not achieve the conservation record established at Conroe, but it helped. This record has been made possible by both the proper spacing pattern and the adoption of operating procedures best suited to the operation of the field as a whole. These procedures were worked out by the Conroe Operators Association, a cooperative organization which came into existence early in 1932. Its members are now composed of all major companies, 90 percent of the independents and some Southeastern New Mexico. These committees are: Yates Pool Engineering Committee, Judkins Pool Engineering Committee, Goldsmith Pool Engineering Committee, North Basin Pools Engineering Committee, and Lea County Operators Committee.

In recent months the Permian Basin of West Texas and Southeastern New Mexico has been in the national spotlight for two reasons, first, for the availability of crude oil for the war effort, and second, as a prospective area for new reserves. It may be of interest to compare the wells and acreage of those fields in which engineering committees operate, to the wells and acreage of the Permian Basin as a whole. The available figures for making the comparison were taken from the AIMME and are as of January 1, 1943, as follows:

PERMIAN BASIN	WELLS			Percent	Proven Acreage	Percent
	Flow	Pump	Total			
Total	10,779	9,067	19,846	100.00	648,883	100.00
Committee:						
Lea County	2,835	926	3,761	18.95	160,570	24.74
Yates	515	40	555	2.80	20,000	3.08
Judkins	81	92	173	0.87	6,200	0.96
Goldsmith	914	58	972	4.90	20,000	3.08
North Basin Pools	2,769	158	2,927	14.75	129,260	19.92
Total	7,114	1,274	8,388	42.27	336,030	51.78

of the royalty owners. While most of the field work is done by company engineers, the association hires a full-time resident engineer who assembles and compiles the engineering data for the field as a unit, after which it furnishes the operators.

The Conroe field has two producing oil sands. The Cockfield sand is from 10 to 15 feet in thickness, and the underlying Conroe sand averages around 60 feet in thickness. The combined proven area for both sand approximates 18,000 acres. Both sands have well-developed gas caps. Due to careful completion practices, corrective operations, the choking of wells to protect the gas caps, and the proper field withdrawal rates to make effective use of natural water drive, have all contributed to the conservation of reservoir energy. After almost 11 years, the operating gas-oil ratios were but little in excess of the dissolved gas-oil ratios and 95 percent of the wells producing from the Conroe sand were still flowing. This record of conservation is made more noteworthy by the fact that Conroe is the largest of all Gulf Coast fields and ranks high in the nation. After producing 156,000,000 barrels of oil to October 1, 1943, the estimated remaining reserves approximated 500,000,000 barrels.

Permian Basin Area

With reference to the Permian Basin Area, four engineering committees are operative in West Texas and one in

New Mexico Fields

The Lea County Operators Committee of New Mexico (originally Hobbs Pool Proration Committee) was organized in June, 1930, when voluntary proration was desired in the Hobbs field to assure pipe-line outlets to all leases on an equitable basis. To carry on this work an engineers advisory committee was formed and a proration umpire appointed. After the New Mexico Oil and Gas Conservation Commission was created in 1935, the state deputized the former umpire to continue his proration work and the Hobbs Pool Engineering Committee changed its name to Lea County Engineering Committee. The proration umpire was appointed chairman of this engineering committee. The engineering work of the committee is now confined principally to the 29 fields in Lea County, but in addition, it handles proration matters under the direction of the conservation commission, for all of the fields in Southeastern New Mexico.

The engineering committee of the Lea County Operators Committee furnishes reports to the operators and state and federal regulatory bodies as follows: Proration schedule covering each field by wells, by companies; mid-month proration schedule showing new completions; monthly engineers' report covering total gas, total oil, total water, whether pumping, flowing or gas lift, dry gas, summary of work being carried on by various field engineers committees, gas-oil ratio surveys, bottom-hole-pressure surveys for field by wells by companies; annual reports for Lea and Eddy counties showing total production by wells, by companies, by fields of oil, gas, water, drop in pressure per barrels of oil produced, increase or decrease in gas-oil ratio, monthly and yearly gasoline plant reports showing total gas processed and gasoline recovered. The committee has 10 employees.

Judkins Field

The Judkins pool (Penwell) has a Cooperative Engineering Committee composed of company engineers, one of which serves as chairman. These engineers take periodic bottom-hole pressures, assemble gas-oil ratio and water data, and have made a study of water encroachment. While this information is acquired by only a few company engineers, all of the operators contribute production and other statistical data relative to their leases, and in return are furnished the committee's reports which are quite complete. The field has a proven area of approximately 6200 acres in which 24 operators own 173 oil wells.

Goldsmith Field

The Goldsmith Pool Engineering Committee started its cooperative work in March, 1937, when there was but a small number of wells in the Goldsmith field. The field now contains 983 wells owned by 26 separate operators. The proven acreage totals around 20,000 acres. The committee has maintained a very complete engineering and statistical record of the field throughout its history. This committee was used largely as a pattern for organizing the North Basin Pools Engineering Committee, and its methods for acquiring data are similar.

North Basin Pools

The North Basin Pools Engineering Committee started its cooperative engineering work March 1, 1939. At that time there were a total of 281 wells in the fields in which it operates. Those fields are commonly referred to as the North Basin Pools, from which the committee took its name. As of January 1, 1940, or 10 months after the committee started its work, these fields contained 701 wells. During this period, the number of participating operators increased from 32 to 45 members.

The committee is now composed of 78 participating members, 12 of which may be classed as major companies and 66 as independent concerns. Three operators are not members. The committee is operative in six oil fields located in five West Texas counties. As of November 1, 1943, these fields had 3218

Season's Greetings

Another year of war for all, sorrow for many and toil for most of us, is about to end. But with it all, old friends and new friends are now, more than ever, symbols of America and what America stands for.

We want to extend Season's Greetings to our many friends—to thank them for their loyal support which we shall always do our utmost to preserve and deserve—and to wish for them a full measure of happiness and prosperity throughout the coming year —and for all the years ahead.

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producing oil wells with an aggregate of around 140,000 proven acres of oil land. The estimated reserves underlying this acreage approximates one billion barrels of oil, or about 5 percent of the nation's total. The following tabulation shows the approximate size of the North Basin pools:

FIELD	COUNTY	No. of Operators	Number Wells	Average Depth	Approx. Acreage
Seminole	Gaines	13	300	5286	13,500
Wasson (5100)	Gaines and Yoakum	54	1,446	5158	55,000
Wasson (6200)	Yoakum	1	1	6881	250
Wasson (7200)	Yoakum	1	1	7433	250
Waples-Platter	Yoakum	3	7	5296	1,000
Ownby	Yoakum	4	8	5335	1,000
Dean	Cochran	3	8	5044	2,000
Slaughter	Cochran, Hockley and Terry	46	1,447	5014	67,000
	Total	..	3,218	....	140,000

The committee maintains its main headquarters office at Midland, Texas. It also maintains two branch offices, one at Denver City in the Wasson field and one at Sundown in the Slaughter field. The chief duties of the committee's engineers have been, witnessing potential tests, making bottom-hole-pressure surveys, spot checking gas-oil ratios and preparing monthly and annual reports for the 78 oil operators composing the committee.

Potential Tests

With the exception of the Waples-Platter field which is on a per-well basis and the Dean field which is on a per-well-plus-acreage basis, potential is an important factor in the allocation formulas for the North Basin Pools. In the Seminole and Ownby fields 25 percent of the field outlet is assigned to potential and 75 percent to acreage. In the Wasson and Slaughter fields the field outlet is allocated on the basis of 50 percent to potential and 50 percent to acreage.

Because of the weight given to potential in the allocation formulas, a very close check has been maintained by having committee witnesses on all wells while they are being potentialed. During the early history of the committee the Seminole, Wasson, and Slaughter fields were retested pursuant to railroad commission orders under the direction of a commission engineer. All retests were witnessed by both representatives of the committee and offset operators.

During and since these field retests, with the approval of the operators, the committee engineers have taken hourly gauges during potential tests for the 6-hour flows from which the 24-hour potentials are calculated. The vigilance exercised in thus witnessing potentials has resulted not only in uniformity of taking potentials as prescribed by the applicable field rules, but in addition, has resulted in a great deal of flow and gas-oil ratio data for the subject fields.

Upward of 24,000,000 gallons of acid have been used in the North Basin Pools to increase the permeability in the dolomitic reservoir rock around the bore of the wells. The large acid treatments frequently result in there being considerable quantities of acid sludge and water left in the producing formation when new well potentials are first taken. As this sludge and water is removed by producing a well over a period of time, its productive capacity commonly increases. This condition has resulted in large numbers of retests, which, in the absence of a railroad commission representative, are witnessed by a committee engineer and one or more offset operators. The field rules provide that any operator in a field is privileged the opportunity to witness any potential whether he is an offset operator or not.

Bottom-Hole Pressures

When the committee first started its bottom-hole-pressure work it was possible to run two general surveys each year with only one unit. As the number of wells increased it was necessary to acquire a second unit and put the field surveys on an annual basis. Recently a third unit was added. While the commission's field rules required only one survey each year in the Wasson and Slaughter fields, it was the practice to make two general surveys per year until about two years ago. This change from a semi-annual to an annual basis was occasioned by a shortage in skilled labor.

Bottom-hole pressures have never been required in the other North Basin pools by commission orders. However, all fields have been accorded the same treatment as in the Wasson and Slaughter fields. The annual bottom-hole-pressure periods for the North Basin pools have been alternated to avoid conflicts in field surveys during the year. This arrangement permits continuous employment for both engineering personnel and equipment, which is necessary in order to cover the large number of wells with a shortage of engineers.

Committee engineers run all the bottom-hole pressures in the North Basin pools except for one company. Engineers for this company calibrate their bombs on the committee's dead-weight tester and cooperate to the extent that their testing in a field is carried on concurrently with the committee. Thus, the pressure from the two sources are comparable as to time.

The bottom-hole-pressure work in the North Basin pools started long before there were enough wells to delineate the pressure pattern or denote the trends in field decline. For the past two years, however, development in the Seminole, Wasson, and Slaughter fields has been complete enough to give basic pressure control for future comparisons. The per-acre withdrawal in these fields to date ranges from around 500 barrels to 900 barrels. Five general bottom-hole pressures have been made in the Seminole field, eight in the Wasson field and five in the Slaughter field. Upward of 11,000 pressure determinations have been made in these three fields.

Gas-Oil Ratios

The Railroad Commission of Texas requires that a gas-oil ratio test be made on each well while an official potential test is being made, provided, of course, the gas volume is sufficient to be measured by ordinary field methods. Gas-oil ratios so determined are called "potential gas-oil ratios." Since committee representatives witness all potentials, with few exceptions, a good idea of the gas-oil ratio situation in each field has been obtained from this source. Where the well makes more gas per barrel of oil than the permissible limit, as set out in the field rules, the well's allowable is penalized. This generally results in the well being worked over and the gas factor reduced before the well is re-potentialed.

For a number of years the railroad commission required semi-annual gas-oil ratio surveys in the North Basin pools and other fields in West Texas. About a year ago, due to a shortage in manpower and automotive equipment, the commission amended its order by requiring only one survey per year. The gas-oil ratio tests made during these general surveys are determined for each well during the time that each such well produces a quantity of oil which approximates its daily allowable production under normal operating conditions. These gas-oil ratios are designated as "operating gas-oil ratios" to distinguish them from potential gas-oil ratios. Each operator reports the results of these general surveys to the commission.

Soon after the operators file their gas-oil ratio reports for general surveys, the committee engineers assemble this data and compile it by leases and by fields. When this is done, the data is broken down and summarized for each field as a whole. Aside from showing the total oil and gas produced during each survey from which the weighted average gas-oil ratios are calculated, these summaries also show the general water situation in each field. The over-

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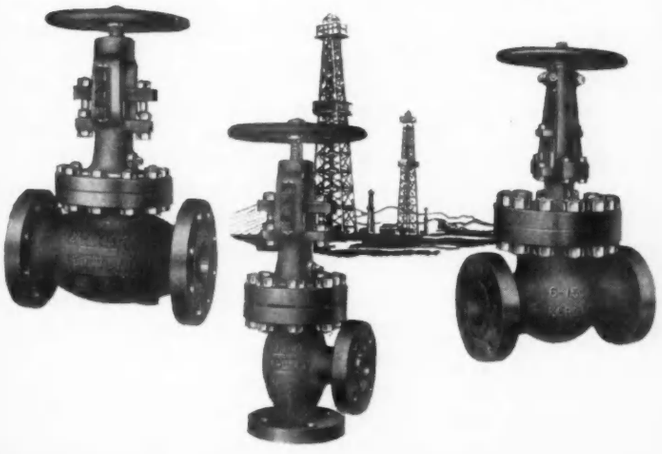

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all gas-oil ratio and water situation is of special importance to each individual operator in a field.

High gas-oil ratios have not been a general serious problem in the North Basin pools, but will likely become more and more troublesome as the fields become older. Only recently the committee started a program of spot checking gas-oil ratios. This program was started on account of increases in ratios due to individual well depletions as well as to increases in allowable.

Committee Reports

The North Basin Pools Engineering Committee's plans of operation provide that the participating operators shall be furnished both monthly and annual reports. While the committee is composed of only 78 members, a large number own properties in two or more of the subject fields. The current mailing list totals around 190 names. Representatives of the Railroad Commission of Texas and the Petroleum Administration for War are included in this number. There is no specified number of reports to be furnished any member, large or small. The usual practice has been to furnish each member as many reports as he needs, one for the main office, one or more for the branch offices, and sometimes one for the banker.

Since and including April, 1939, all committee members have been furnished monthly reports. For the first nine months all non-members were also supplied monthly reports in order to acquaint them with the character of the committee's cooperative work. Except for the initial organization of the committee no special effort has been made to acquire new members as membership is on a purely voluntary cooperative basis. All non-members are invited to participate in discussions at all general or special meetings of participating members.

Committee engineers have prepared four annual reports covering the North Basin pools. Each of the 1940, 1941, and 1942 reports contained essentially all statistical and engineering data for the entire fields at the time they were prepared. Thus each time a new annual report was prepared, the previous one could be discarded. However, when the 1942 annual reports were prepared, they were made with the idea of their being supplemented each year until the fields approach full development. Then it is planned to prepare a general basic report for each field. In line with that idea, the 1943 annual reports merely supplemented the 1942 reports.

The data for the monthly and annual reports is acquired from three sources; first, from the committee's field engineers; second, from the records of the railroad commission, and third, from the files of the operators. The data from these sources is assembled, compiled and summarized in such manner that it may be easily translated into meaning for either the individual lease or the field as a whole. As an aid to this end, a number of maps, charts, and cross-sections have been employed. The reports are quite complete with reference to bottom-hole pressures, gas-oil ratios, oil and gas production, the water situation, potentials, well-log data and other general statistics.

Per-Barrel Cost

The committee's paid personnel consists of a chairman and secretary with headquarters at Midland and five petroleum engineers and a trainee whose headquarters are at Denver City in the Wasson field and Sundown in the Slaughter field. Aside from these regular employees, swampers for the bottom-hole-pressure units are picked up in the fields. The automotive equipment consists of three pick-ups used as bottom-hole-pressure units and three coupes used as field cars. The committee owns and maintains field offices in both Denver City and Sundown. The salaries and other expense incident to carrying on the committee cooperative engineering work have been derived on a pro rata basis from assessments on pipe-line runs as follows:

Average Cost Per Barrel

10 months, 1939	$0.00496
12 months, 1940	0.00229
12 months, 1941	0.00228
12 months, 1942	0.00203
11 months, 1943	0.00196
Weighted Average	$0.00231

Conclusions

The first cooperative engineer committees or associations were organized to assist in voluntary proration work. In order to have some basis for agreements, it was necessary to set up an organization to assemble and compile all available data for the field as a unit. At first this work was purely statistical. Later these organizations started acquiring engineering data on their own initiative.

Pursuant to applicable laws, after proration became a function of the state, the oil-regulatory authorities made certain requirements in the interest of conservation on the producer. Foremost among these requirements, were periodic gas-oil-ratio and bottom-hole-pressure surveys. As a result of these regulations the older committees were maintained and new committees were formed to acquire this and other new data required by the state.

One of the most important functions of a cooperative engineering committee is the compilation of all general engineering and statistical data for the field as a unit. Through monthly and annual reports the operator may see the relationship of his lease to all other leases in the field. After all is said and done, good conservation practices in the production of oil are based chiefly on two things: first, the proper completion of wells, and, second, the efficient rate of withdrawals from the individual well and from the reservoir as a unit. In order to accomplish this objective in a field where there is a large diversified leasehold ownership, each operator should see the picture as a whole. This data is especially desirable when going before the oil-regulatory authorities for changes in allowables and corrective measures designed to prevent physical waste.

In those fields in which cooperative engineering committees are employed, the more technical engineering projects are carried on by the individual operator. Such projects as bottom-hole sampling, core analyses, productivity indexes, permeability and saturation tests, and many others, could be carried on under the auspices of committee engineers. At present, however, the more highly technical projects are left to the initiative of the individual operator. Many of the major companies have their own laboratories and technical staffs for carrying on this specialized type of engineering. This same service is also available to independent operators through consulting engineering firms. In fact, many of the major companies draw heavily on this type of specialized service.

There are a number of fields in Texas in which the leasehold interests are small, and the company engineers as individuals exchange data with one another, much in the manner as oil scouts exchange information. In a number of these fields the picture as a whole is practically as complete as in those fields in which engineering committees operate. However, where the leasehold interests are large, this simple arrangement for acquiring engineering and other data for the field as a unit does not work. Should a large number of the producers in a field undertake to carry on the more common types of petroleum-engineering work individually, there would be a duplication of specialized manpower, engineering and automotive equipment for acquiring the information. The data so acquired would still have to be assembled and compiled before it could be translated into its fullest meaning for the individual lease or the field as a whole, to say nothing of the added cost.

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Determining Probability of Success Of Secondary-Recovery Operations

PART 6
Influence of Viscosity of Crude Oil on Secondary Recovery

By W. A. HEATH
Phillips Petroleum Company, Bartlesville, Oklahoma

THE influence of viscosity of oil in governing the rate of flow of the repressure media which, in turn, affects the spacing program and flood life of secondary-recovery projects is discussed. The mechanism of oil displacement by gas and water is presented to show the effect of viscosity of oil in influencing the economic recovery. The order of magnitude of differences in economic recovery with varying viscosity has not been evaluated in field operations. Within the small range of viscosities in which secondary-recovery operations have been conducted, sedimentation conditions and fluid contents of the reservoir have had more bearing in determining the amount of recoverable oil than viscosity.

This article is part of a symposium on secondary recovery presented at the annual meeting of the American Petroleum Institute, Division of Production, on November 9, 1943, at Chicago. The symposium consisted of 10 papers. Other papers will be published in future issues.

VISCOSITY is defined as the resistance of a material or a mixture to flow when force is exerted upon it. Viscosity of oil is usually expressed in absolute viscosity units, known as centipoises. As the viscosity of water at 68.6° F. is 1 centipoise, the viscosity of oil is often spoken of as being relative to water. Oils which have been successfully subjected to secondary-recovery methods have ranged from 2 to 30 times the viscosity of water.

The function of viscosity in fluid flow is apparent in formulas used in calculating flow through pipe lines and porous media in which the rate of flow is inversely proportional to the absolute viscosity.

Viscosity of the oil is important in secondary-recovery operations, as it is one of the factors that affect the spacing program and operating life and has a bearing on the amount of economically recoverable oil. From the practical standpoint, we are interested in the degree to which viscosity affects each of these factors. Theoretically a 10-centipoise oil requires twice as long a period for secondary depletion as a 5-centipoise oil, other factors being equal. Whether the mixture of connate water, gas, and oil under reservoir conditions affects this simple viscosity proportion has not been established; therefore, we can but assume the validity of the theoretical relationship.

In order to deplete a 10-centipoise oil in the same period of time as required to deplete a 5-centipoise oil, it would be necessary to adopt a closer spacing pattern with twice the number of injection wells—presuming, of course, that the maximum injection pressure and volumes are used in each case. In many cases land subdivisions, sand continuity, spacing of existing wells, pumping-equipment capacity, and the personal equation regarding the proper injection volumes control the spacing pattern and flood life to a much greater degree than viscosity.

Buckley and Leverett[1] have presented an excellent description of the mechanics of oil displacement by water drive and the effect of the viscosity of oil upon such displacement. They have divided the displacement into two phases which they have termed the "initial" and "subordinate" phase. The "initial" phase is described as that in which the invading water upon reaching any given vertical plane in the sand accumulates within the pores in the plane, ejecting oil into the oil "bank" ahead, until the water saturation is sufficiently high to permit the water to pass beyond the plane. When this stage has been reached, the displacement mechanism passes into the "subordinate" phase during which both oil and water are ejected from the plane in a gradually increasing ratio of water to oil as the net accumulation of water in the plane increases.

Buckley and Leverett point out that increased oil viscosity results in attainment of a lower water saturation during the "initial" phase of the flood as well as a more gradual approach to the residual saturation during the "subordinate" phase. Figure 1 presents their calculated effect of oil viscosity on the efficiency of the "initial" phase of displacement. This indicates that a 2-centipoise oil will permit a water accumulation of 63 percent before the water will "break through" beyond the plane in comparison with a 50 percent accumulation with an 8-centipoise oil.

Figure 2, showing the water-oil ratios obtaining in the "subordinate" phase of displacement for oils of varying viscosities, has been calculated from Leverett's[2] data on relative permeabilities of unconsolidated sands to oil and water which over a moderate range are independent of viscosity, and from the following formula offered by Leverett for computing water-oil flowing ratios at any particular oil saturation:

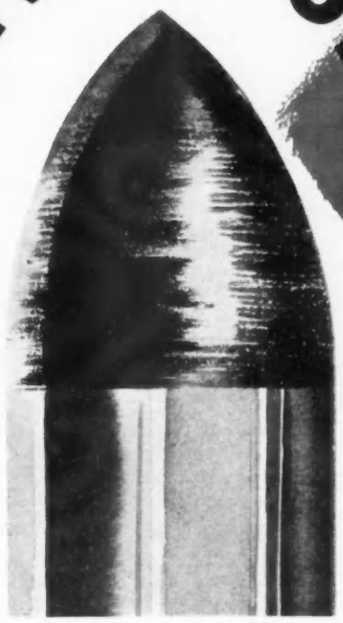
$$X = \frac{1}{\frac{Ko' \, Uw}{Kw' \, Uo}} + 1$$

Where:

X = water fraction in the flowing fluid.
Ko′ = relative permeability to oil.
Kw′ = relative permeability to water.
Uw = viscosity of water, centipoises.
Uo = viscosity of oil, centipoises.

It appears from these data that the

OGIVAL-POINT



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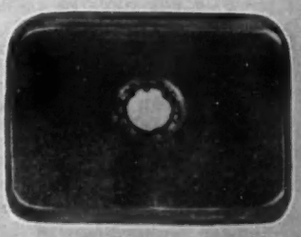

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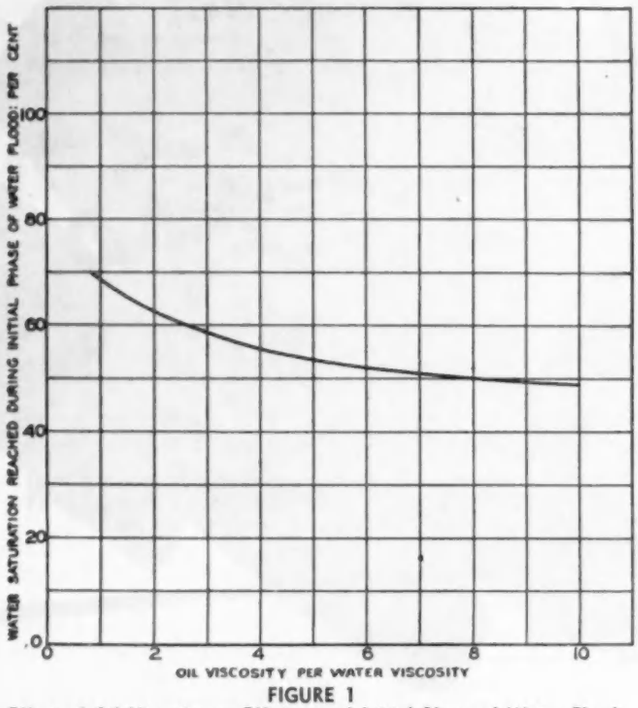

FIGURE 1
Effect of Oil Viscosity on Efficiency of Initial Phase of Water Flood (from Buckley and Leverett).

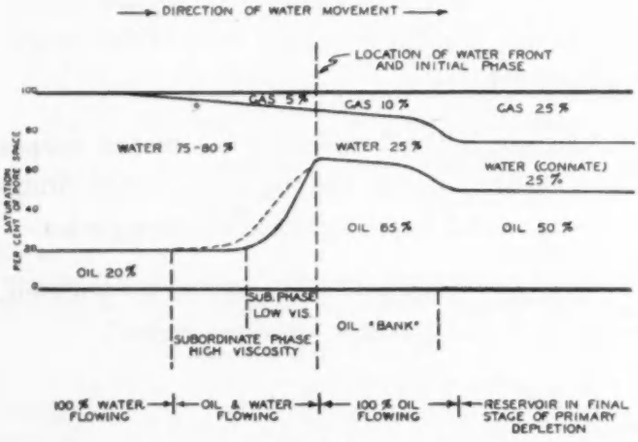

FIGURE 3
Fluid Saturation of Reservoir During Various Phases of Water-Drive Displacement.

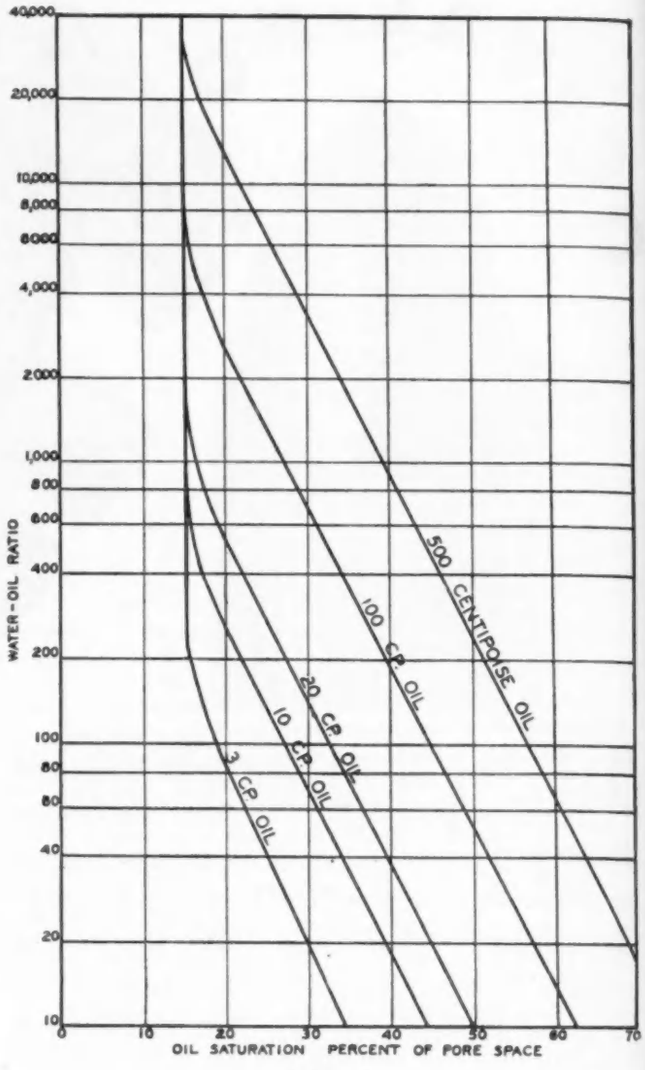

FIGURE 2
Calculated Water-Oil Ratios of Subordinate-Phase Displacement of Oils of Various Viscosities from Unconsolidated Sands.

residual saturation or physically unrecoverable oil is independent of viscosity if the displacement process be carried to infinite water-oil ratios. No data have as yet been published on relative permeability of consolidated sands to oil and water.

Both the lower water accumulation in the "initial" phase and the more gradual approach to the residual saturation that characterize the higher-viscosity oils result in higher water-oil ratios during the displacement mechanism. However, such water-oil ratios obtain only in the transient "subordinate-phase" zone, immediately back of the water front. In the sand body back of this transient zone, the flowing medium is 100 percent water while in the sand body ahead it is 100 percent oil (at low interstitial or connate-water values). Figure 3 shows saturation conditions existing in an average reservoir in the path and wake of an encroaching water front. The problem with which we are confronted in determing the effect of viscosity on flooding efficiency is the order of magnitude of the distance which the water has advanced beyond a plane in the sand at the time the fluid passing through the plane reaches 100 percent water and all of the physically recoverable oil has been removed. Although this distance becomes greater as the viscosity increases, if the magnitude is only a matter of a few feet greater within a moderate range of viscosity variation, then viscosity becomes of minor importance as a factor influencing recovery.

In laboratory flooding of naturally saturated core samples of approximately 1-inch wall thickness, it was observed that 90 percent of the physically recoverable oil was given up by the sample when the water throughput was such that the water front would have advanced approximately 5 feet beyond the sample in traveling through sand of the same characteristics. The remaining 10 percent of the physically recoverable oil required an advance of the water front an additional 10 feet. However, as the residual saturation of cores under laboratory flooding is usually reduced to a lower value than obtainable in field practice due to higher pressure gradients, it is possible that under actual field condi-

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*One of the two standard Schlumberger loads.

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TABLE 1

Average Residual Saturations of Flood-Pot Samples of Cores of Mid-Continent Sands

(Viscosities determined at reservoir temperature)

CORE	Viscosity of Oil (Centipoises)	Viscosity of Oil At °F.	Residual Saturation (Percent)	Residual Saturation (Bbls. Per Acre-Foot)
1	16.8	66	20	435
2	16	68	18	303
3	16.8	66	23	335
4	16	68	26	400
5	13.2	70	26	355
6	16.8	66	19	328
7	16	68	26	443
8	16	68	26	415
9	16.8	66	23	280
10	19.9	70	25	367
11	19.9	70	19	330
12	19.9	70	18	298
13	19.9	70	24	386
14	19.9	70	20	305
15	19.9	70	26	374
16	19.9	70	27	411
17	19.9	70	22	370
18	19.9	70	16	278
19	49.3	69	29.5	509
20	49.3	69	27.5	450
21	6.3	75	23	363
22	6.3	75	27	401
23	6.3	75	20	311
24	6.3	75	27	423
25	6.3	75	24	365
26	6.3	75	20	300
27	6.3	75	20	340
28	6.3	75	20	317

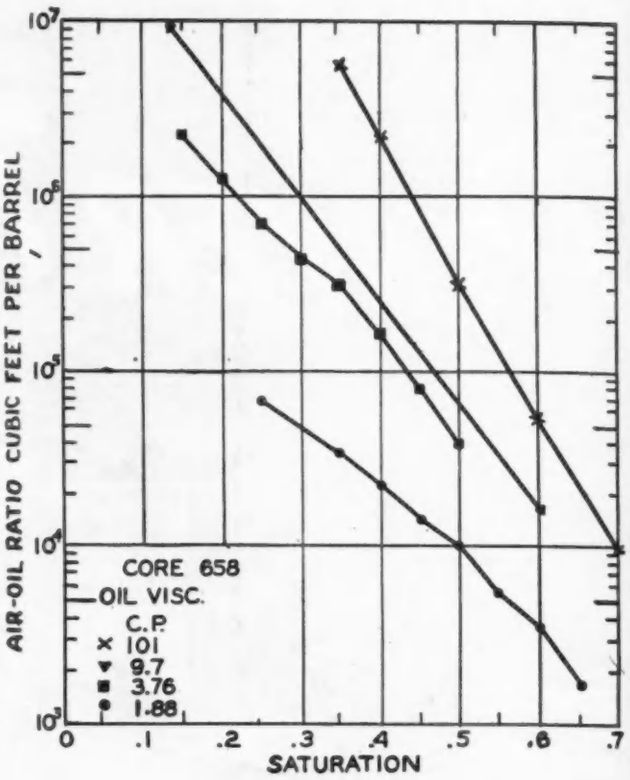


FIGURE 4

Effect of Oil Viscosity on Efficiency of Air-Drive Operations (from Krutter).

tions all of the physically recoverable oil would have been given up when the water front had advanced only 5 feet.

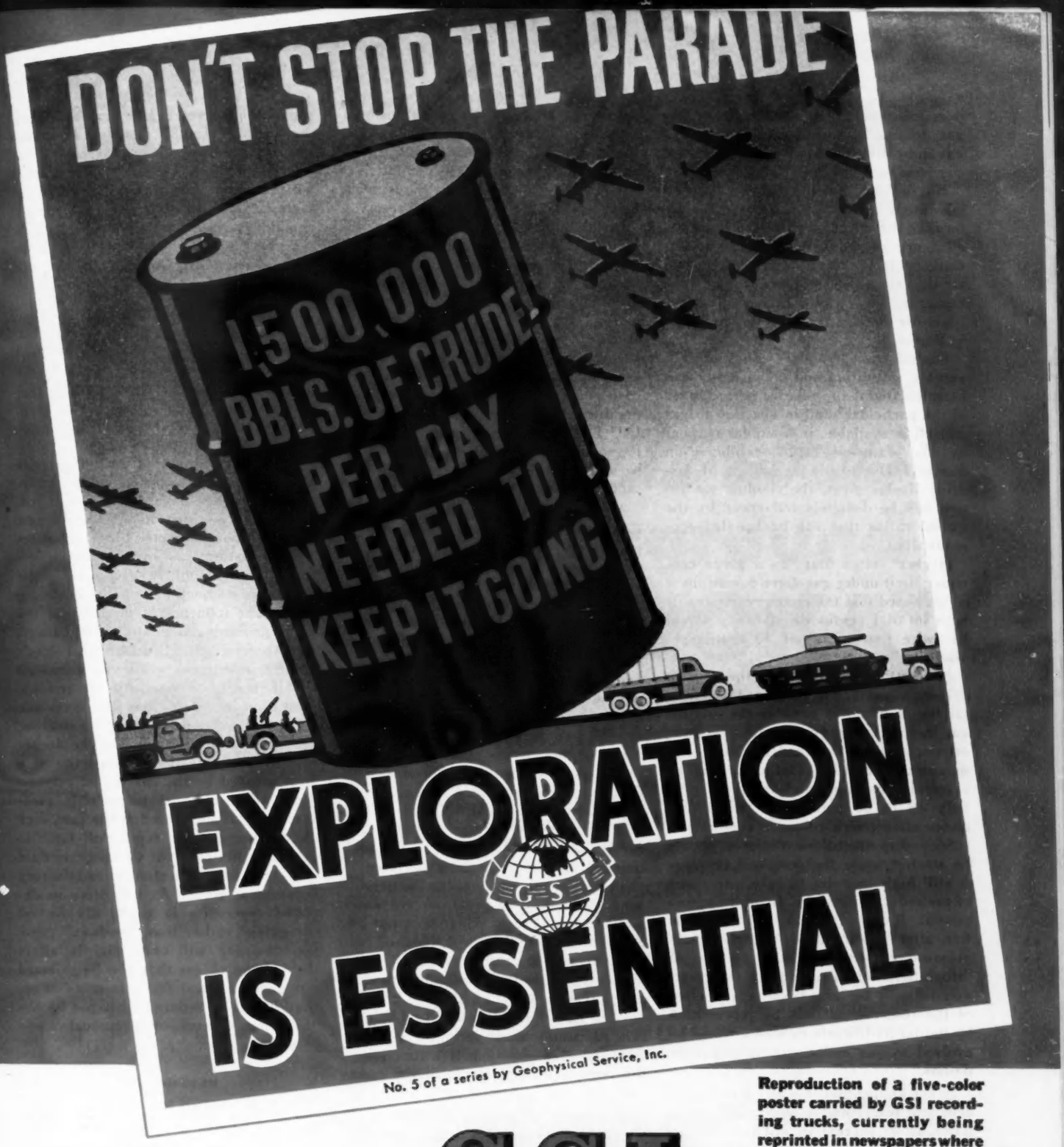
It is realized that such meager data give only a hazy picture of the possible length of the "subordinate" phase, and that in all probability this phase becomes more dispersed the farther the water is required to travel in reaching the output-well bore. The sands which are normally encountered in flooding operations consist of multiple zones of varying permeabilities which result in a non-uniform floodout of the sand body, with the higher permeabilities being flooded out first. Thereafter the injected water continues to pass through the flooded-out zones while the zones of lower permeability are still yielding oil. Under such conditions, even though the length of the "subordinate" phase of the more viscous oils is of the order of 50 or 75 feet back of the output well at the time the water front reaches the well, it is possible that all of the physically recoverable oil will be obtained from the more highly permeable zones due to the necessary recycling process. The more dispersed "subordinate" phase accompanying the more viscous oils would then result in reduced economic recovery from the less permeable zones only. As the higher permeable zones usually have higher porosities and lower connate-water contents, the recoverable oil from these zones will be proportionately greater than from the less permeable zones. It is conceivable, of course, that in displacement of the very highly viscous oils the "subordinate" phase might be operating over the entire distance from input to output well when the water front reaches the output well, in which case the economics of water-oil producing ratios would govern the residual saturation.

The lack of accurate information on the length of the "subordinate" phase precludes a quantitative evaluation of the effect of viscosity on residual saturation from an economic standpoint. It is hoped that future field correlation and research investigation will furnish a basis to enable determination of such conditions.

It has been recognized that viscosity is of minor importance in determining the residual saturation in sands that up to the present have been subjected to artificial flooding, and that such factors as sedimentation conditions and connate-water content are of much greater importance in influencing the residual saturation. For instance, it has been observed in flood-pot tests conducted on naturally saturated cores taken from the same 20-centipoise-viscosity oil pool that samples having initial oil saturations of 45 percent were reduced to 29 percent residual saturation, whereas those having 31 percent initial saturation were reduced to 21 percent. The variation in both initial and final saturations is attributed to a different quantity of connate water in the samples, the total liquid content of all samples being of the order of 75 percent prior to flooding. It will be noticed that the percentage recovery of the initial oil is roughly the same; however, in percentage of pore space, the recovery of the higher initial oil-content core is 60 percent greater.

Table 1 lists the average residual saturations of flood-pot samples of cores taken in the Mid-Continent region, and indicates a wide spread of the results obtained.

Buckley and Leverett[1] bring out the effect of the difference in viscosity of gas and water on their efficiency as oil-driving media. With a viscosity ratio of gas to oil of 0.009, the gas saturation attains a value of 15 percent of the pore space in the initial phase of the displacement as contrasted to a comparable water saturation of about 60 percent for oil of the same viscosity. As the gas saturation of a depleted sand prior to start of secondary operations is of the order of 20 to 35 percent, there will be no "initial" phase or "banking" of the oil in gas-drive operations comparable to that attained in water-drive displacement but, instead, the displacement over the entire distance from input to output well will always be in the "subordinate" phase, and the gas will move the oil by dragging rather than pushing. To offset the inefficiency of this type of displacement, it is possible, due to the com-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pressibility and lower viscosity of the gas, to inject much larger volumes of gas into the reservoir than water at comparable pressures.

Hassler[3] and Krutter[4] have conducted laboratory tests on core samples to determine the effect of oil viscosity on the efficiency of production in gas- or air-drive projects. Their data indicate that, as the viscosity of the oil increases, higher gas-oil ratios are required to recover the oil. Krutter's results are shown in Figure 4.

Gas-oil ratios under conditions of varying saturation and oil viscosity can be calculated if the relative permeability of the particular sand in question to gas and oil is available, in a similar manner as the water-oil ratios exhibited in Figure 2. Due to the mechanism of gas-drive displacement, the residual saturation will be definitely influenced by the gas-oil ratios that can be handled economically.

Horner[5] states that "to a given economic limit under gas-drive conditions it is calculated that the recovery obtainable with oil of 1 centipoise viscosity would be twice that of oil of 10 centipoises viscosity."

Leverett[2] points out that there is an evident advantage to be gained by maintaining as much as possible the original gas in solution, as its loss increases the oil viscosity. Holcott and Buckley[6] have measured viscosities of oil under original reservoir conditions, and find them to be only 40 to 60 percent of their value under atmospheric-pressure conditions.

Secondary operations, therefore should be started while the reservoir pressure is still high in order to take advantage of the reduced viscosity. In addition to a possible lower percentage oil saturation left after water drive under higher-pressure conditions, the volume of "stock-tank" oil remaining in the reservoir oil will be less, because a portion of the reservoir oil will be represented by lighter hydrocarbons which would be evolved as gas under atmospheric conditions.

In the application of water flooding to depleted reservoirs, a reduction of as much as 40 percent in viscosity of the produced oil has been observed in areas where the reservoir pressure has been almost entirely depleted. A lesser magnitude of reduction was noticed in the lower-gravity (28° API) oil areas and in pools where some reservoir pressure still existed. Coincident with the viscosity reduction was an increase in gravity up to 3° API, which is of economic importance when the crude price scale is based on gravity.

The use of air for repressuring is less desirable than gas, as air has a tendency to oxidize some crude oils—causing an increase in the viscosity of the crude.

Where reservoir pressure is practically zero gage, viscosity determinations conducted on fresh oil samples taken from the bleeder of a producing well are, for all practical purposes, representative of the viscosity of the oil in the reservoir; however, where appreciable reservoir pressure exists, samples so taken will indicate higher viscosities than actual. As viscosity varies with temperature, the determination should be made at the same temperature that exists in the reservoir.

Deeper reservoirs have the advantage of higher temperatures and, therefore, lower viscosities. Of course, the viscosity of water also decreases with temperature, being only 0.5 centipoise at 133° F. compared to 1 centipoise at 68° F., so that water under increased temperature will flow more readily through sand strata that have been watered out.

Although artificial flooding in the Mid-Continent has not as yet been applied to pools where the oil viscosity exceeded 30 centipoises, higher-viscosity oils should not be excluded from the realm of profitable secondary operation. Certain reservoirs containing the more viscous oils may have high residual-oil saturations after primary gas-expansion depletion; and, even though the oil saturation cannot be economically reduced to as low a value as the less viscous oils, the recovery per acre-foot can be greater. Much of the success of flooding the 20-centipoise-viscosity oil pools of eastern Kansas can be attributed to a relatively low connate-water and high oil content of the reservoir. Water contents will range from 25 to 35 percent as residual-oil saturations of 45 to 50 percent in comparison with Nowata-Bartlesville sand contents of 35 to 45 percent water and 35 to 40 percent oil. It does not follow, however, that high residual-oil saturations are characteristic of all high-viscosity oil pools. Botset and Muskat[7] and Leverett and Lewis[8] have brought out the fact that the residual-oil saturation remaining after normal gas-expansion depletion is primarily a function of the connate-water content of the reservoir.

The range of oil viscosities in pools which have been successfully exploited by secondary methods in the Eastern and Mid-Continent areas is considerably lower than the viscosity of oils in some of the pools in the Rocky Mountain and Pacific Coast areas. As a consequence it is impossible to predetermine from existing secondary-recovery experience whether successful application may be made in the higher-viscosity pools. Only actual pilot-plant tests will prove the point.

A shallow 500-centipoise-viscosity oil pool in Louisiana has been subjected to various secondary-recovery methods—including injection of steam, gas, and water—with results too disappointing to warrant continued prosecution of any of the methods. In this instance, however, the apparent lack of success cannot be entirely attributed to the viscosity, as a bottom water sand was present causing high natural water-oil ratios, and such a condition presents a difficult problem in secondary-recovery operation even in low-viscosity reservoirs.

Summary

In summary, it seems apparent that, to a given economic limit of water-oil or gas-oil ratio, the more viscous oils will yield less recovery than the less viscous oils, other conditions being equal. The magnitude of such difference has not been evaluated in field experience. In general, within the small range of viscosities in which secondary-recovery operations have been conducted, other factors—such as geological and sedimentation characteristics, and water and oil saturations of the reservoir—have more weight in determining the amount of recoverable oil than viscosity alone. The influence of viscosity of the oil in governing the rate of fluid travel and, therefore, the flood life and development investment will by far outweigh the influence of viscosity on residual saturation in determining the economic success of water flooding of the shallow, less permeable reservoirs. In the deeper reservoirs, where the well spacing may be controlled by the spacing of existing wells, the additional permissible pressure that can be carried at the sand face due to the greater depth will tend to overcome the effect of viscosity on fluid flow and enable injection of satisfactory volumes of water. As gas drive in depleted reservoirs is essentially an oil "dragging" rather than "pushing" process, viscosity will only slightly affect the volume of gas that can be injected into the sand, and the economics of recovery will be definitely affected by the gas-oil ratios required in removal of oils of varying viscosity.

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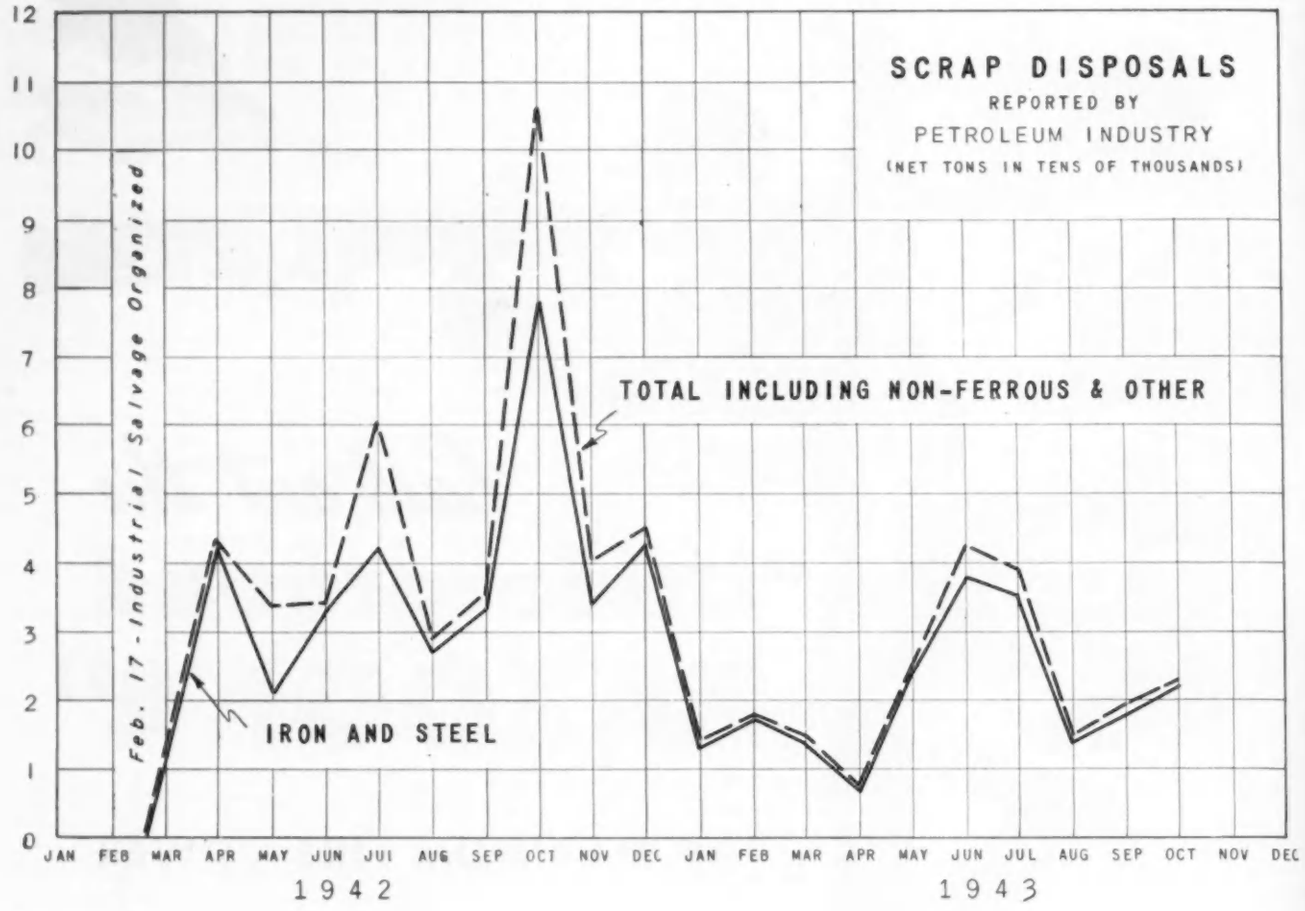


Scrap Situation Bad

By LUM PRICE, Chairman,
Houston Industrial Salvage Committee

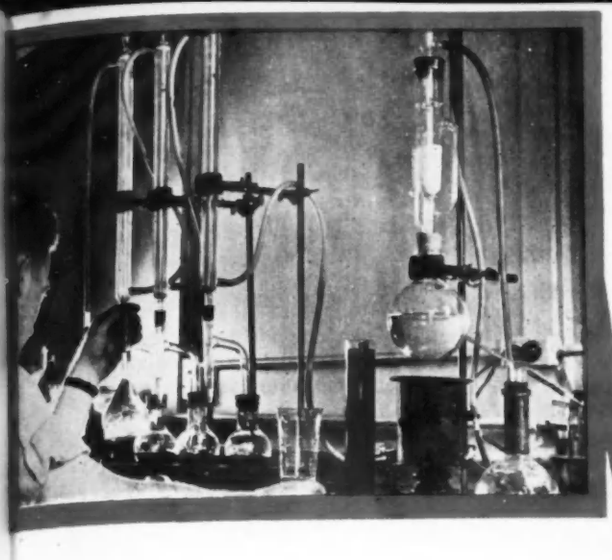
THE scrap situation is worse than you think. Although there has not been a furnace shut down for lack of scrap since April, 1942, many have come very close to running out of scrap in the recent months. As a whole there is not more than five or six weeks' supply of scrap now available to mills, and some mills could operate only a few days if movements of scrap to them should stop.

The high consumption of scrap by the steel industry accounts largely for this shortage, coupled with limited movement of ore last spring through frozen areas of the Great Lakes. The coal shortage from strikes cut deeply into production of pig iron, necessitating open hearth furnaces' using more of their scrap reserves. There has also been a serious reduction in scrap from domestic sources and the automobile graveyards have declined 80 or 90 percent from their peak of around 500,000 tons monthly and actually have been reduced to a very ordinary tonnage. Doubtless, this source will continue to decrease for some time yet. Then, too, there has as yet been only a limited tonnage of ferrous battlefield scrap returned to the United States.

To further aggravate the present situation, shipments and handling of scrap from many parts of the United States are very slow and in some instances there are none at all during the winter months. Nevertheless, steel mills are expected to maintain their high rate of operation.

Since all mills have operated at above 90 percent capacity, to say nothing of the greatly increased capacity in the last two years, it may be seen that the constant drain on all sources of scrap would tend to exhaust the supply, especially if any appreciable tonnage of steel is shipped out by export from which no scrap would be returned. It is estimated that steel production will reach 89,000,000 tons for 1943 against 87,000,000 tons for 1942. Summing up this situation, we find that scrap must be made available and turned out now to avoid furnace shutdowns as the winter progresses toward spring.

The accompanying chart on scrap as



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reported by the petroleum industry for 1942 and 1943 indicates the part this industry is playing in the steel program. It is felt that a good tonnage of scrap was moved and not reported on Form WPB-919, and hence a complete picture of this matter is not reflected by the figures of this chart.

It so happens that the areas in which petroleum industry operates in the United States are such that shipments of scrap may be made even in the winter months. Therefore, there is an opportunity for the industry to make a worthwhile contribution particularly at this time.

The industry, especially as relating to 100-octane gasoline rubber, and other products, stands high on the preferred list of essential operations of War Production Board, and operation of this industry is calculated to be maintained at a fair rate. This should result in a reasonable production of scrap. Scrap from this industry is generated from maintenance, repairs, replacements, and obsolescence.

Why Petroleum Industry Should Give Special Attention to Releasing Scrap

In the first place scrap released removes unsightly litter and safety hazards. Premises that are cluttered with discarded and otherwise useless materials promote accidents and ultimately lost time. This we can ill afford. Second, disposing of scrap represents the final step in economy of operation, and although the monetary returns may be small for any one plant or district, it will add up over a large organization. Third, scrap values now to the war program may mean more than the new value of the material which replaces it. This will doubtless be true as long as steel operations continue at the present rate. And last, scrap should be released at least to reciprocate for the allotment of necessary materials and equipment for current operation secured through Petroleum Administration for War.

One Way to Get the Job Done

Every operator should recheck and rejuvenate at this time his entire salvage organization. If that organization has been discontinued or is not functioning, it should be re-organized immediately with a responsible individual at its head who is in close contact with management. The aid of every employee should be enlisted. This job of cleaning up and keeping clean of scrap requires the assistance of every individual. Then, too, such individuals will carry the scrap consciousness beyond their jobs. Every plant and property should be scoured for all loose scrap which should be accumulated for disposal. Then, every piece of idle equipment should be inspected and considered by proper engineers and management. Find a use for it, sell it to a neighbor who might need it, or scrap it.

Do Not Be Deluded

Much equipment now held for possible future use will be obsolete when manufacturing is resumed. This obsolescence may result from change in design, nature, kind, or change in practices.

Better and improved raw materials promise to be available after the war. Many developments in the nature of alloys, plastics, synthetics, and the like, will then be available, from which far more efficient equipment may be produced. Then, if everyone releases all such old and doubtful material and equipment, the steel industry has a better chance to supply current needs and the War Production Board has a freer hand in allocating necessary requirements.

Practical Suggestions

In handling scrap, transportation conservation should be given first consideration. Scrap should be sold to a regular dealer from the most convenient point of assembly and should not be hauled long distances unnecessarily just to get a larger quantity together, unless that point of assembly is on the railroad, possibly on the properties, and a carload may be accumulated. The dealer's haul in quantities of a truck load or more many times can take the place of transportation in accumulating. Gang and lease trucks may bring to a central junk bin small items on their return trips.

Only limited preparation or segregation is practical or economical. Scrap dealers have more experienced and often lower-paid labor, in addition to other facilities for doing preparation work more cheaply than oil operators. Nonferrous and other special grades, of course, should be segregated and classified as required by the government, or as best possible.

Prices to be expected should be based on ceiling (averaging about $14.00 per gross ton of 2240 pounds for mixed common steel and cast), less cost of loading and hauling to dealer's yard; also less his handling and preparation cost, with some reasonable allowance for his profit and overhead. Incidentally, dealers have suffered along with others in the way of lost manpower, limited transportation, increased overhead, and other factors, and many times are so handicapped that prompt movement may not be made; but in most cases any accumulation can be handled by them within a reasonable time. They have filled an important role in this steel-making program and are entitled to reasonable returns for services performed if they are to continue as a business.

PRACTICAL OPERATING *Hints* FOR THE PRODUCTION MAN

$5.00 will be paid for each illustrated acceptable contribution. Mail to The Editor, THE OIL WEEKLY, *Houston.*

1. INSTRUMENTS

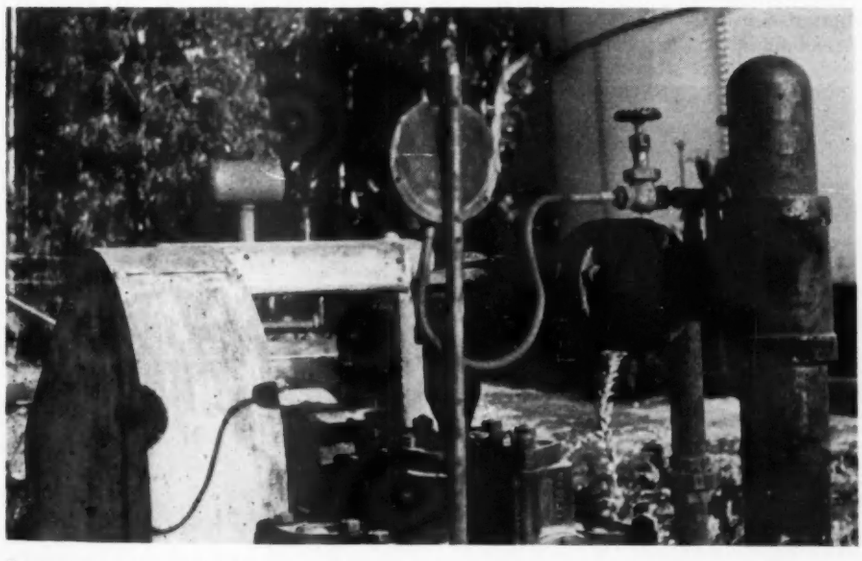
Hose Serves as Pulsation Dampener

MANY of the very effective "shock absorbers" or pulsation dampeners available for gauge protection against pump pound or hydraulic hammer no longer are obtainable—and at the same time it is increasingly difficult to obtain repair parts for those gauges necessary to adequate supervision of oil production.

When the pulsation-absorbing mechanism is unavailable, a substitute is improvised by utilizing a short length of hose between pressure line and gauge inlet fitting. The hose must, of course, be of ample strength to withstand the pressures against which the gauge must operate, and should, if possible, be of a material compounded to resist the dissolving action of the fluid or gas carried.

Where it is impossible to secure hose which will resist the hydrocarbons satisfactorily, it is possible to interpose a column of water or other non-injurious fluid throughout the length of hose. To prepare, gauge is disconnected, and the hose so held that it may be filled with water by gravity, the entire loop back to the control valve being waterfilled, with the well or other line pressure operating against the water face farthest from the gauge.

By putting an ell and short down drop of pipe before attaching the hose, it is easier to insure that the hose shall be full of water at all times than when a horizontal run is used. The water may be protected against cold weather by required percentages of anti-freeze.



Emergency tie-in of high-pressure hose section between gauge and line surges protects mechanism of instrument and enables operations to continue when standard unit is unavailable.

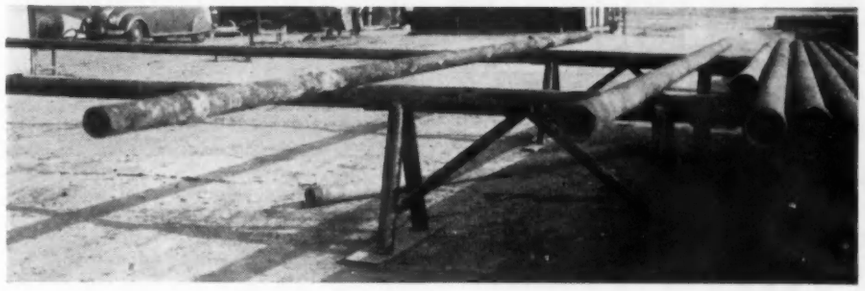
2. MATERIAL HANDLING

Telescoping Supports Speed Pipe Transfer

WHERE pipe is to be handled between trucks and permanent racks, some sort of bridge is required to give direct rolling and eliminate the need for lifting the joints except as required by stacking. The usual skid boards, handy enough if available, frequently are removed for other work and cannot be located when pipe is to be moved.

One company avoids the need for boards by making the horizontal supporting member of the pipe rack structure of heavy pipe, fitting within these tubes joints of pipe, likewise heavy enough to carry the shifting pipe without serious sagging or deformation, and telescoping these extension joints within the supporting members when not in use.

The slip joints are especially useful when pipe is to be rolled across a roadway which must be opened to traffic on short notice. The storage can then be beyond the roadway, yet the pipe made readily available simply by extending the sliding members.



Formed with horizontal members aligned to permit storage of heavy pipe extensions when not in use, this rack provides quick transfer of tubular items without blocking use of roadway.

Beveling the top of the outer pipe so as to remove the abrupt change in rolling surface makes easier the task of handling pipe across the unit, and offers minimum resistance to pipe set rolling on the extension with the intention of having its momentum carry it farther along the rack to the stack already ranged there.

3. GAUGING

Hydrometer Spout Reduces Oil Loss

SOLDERING a spout to the side of the hydrometer cylinder usually carried by field gaugers and attaching a sturdy handle on the opposite side of the unit, aids in return of the oil sample to the sump, the shake-out graduates or the can for laboratory analysis.

If the telescoping windbreak be cut away or flared to accomodate the spout,

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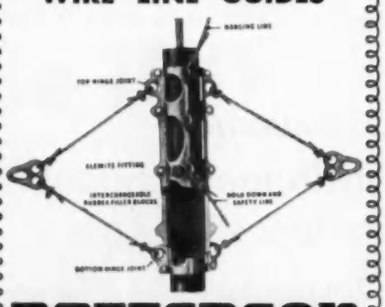

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Flared windshield unit and spout combine to protect hydrometer against backdraft.

the addition of a simplified pouring device does not affect the usefulness of the windbreak for protecting the exposed end of the hydrometer, the flared edges of the windbreak tending to deflect the air blast from its natural course across the gap, and thus to protect the glass instrument from backdraft.

Shaping the handle like a capital letter "P" instead of placing it as an arc or even semicircle aids in balancing the unit in the gauger's hand, and thus gives better control of even a tiny stream when filling a shake-out machine tube.

4. V-BELT CARE

A V-belt with proper tension feels alive, springy, under a light, quick blow applied to it with the edge of the hand —a belt which is too slack has none of this responsiveness, but feels dead, absorbing the blow rather than causing the hand to snap back from the point of impact. Such a loose belt will run unevenly, subjecting the material to a sharp jerk each time it takes the load, and causing premature breakdown.

5. CONTROLS

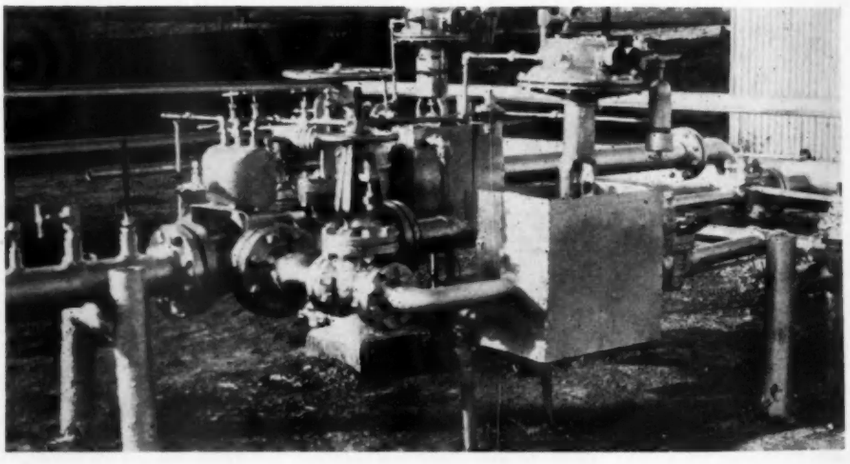
Water Bath Prevents Hydrate Formation

TO PREVENT the freezing of controls through which fluid or gas is expanded — thus possibly lowering the temperature below the hydrate-forming critical point — one company places boxes of light sheet metal around the controls, with piping to allow the flow of hot water around the unit and then either wasted on the ground or returned to the heating system as desired.

The sides are welded with a light but tight bead to the pipes on either side of the instrument, the light flexible metal permitting it to be sprung enough to allow the instrument to be lifted out when the mounting flanges are disconnected.

Since the heating box rides on the line, and is supported by it, the entire set-up is free to shift under expansion changes without stressing any portion of the control piping, the amount of hot water being introduced to provide proper operating temperatures being also supported without overloading..

Use of a light, two-part cover, with raised overlap along the center line will provide against the collection of dust, dirt or rainwater within the box while not in use as heating agent.



Welded to the line and enclosing regulating unit except on top, box may be filled with hot water and operating temperatures maintained above critical point for ice formation.

Maintaining Wartime Compressors At Peak Operating Capacity

By BRUNO THIEL, The Cooper-Bessemer Corporation

TODAY'S shortages in replacement parts, and wartime requirements demanding that compressors be kept at peak operating capacity even when subjected to long periods of uninterrupted service, make it important that maintenance engineers follow certain fundamentals in the care and maintenance of compressor units. The following suggestions are summarized to assure the most efficient performance of large compressors regardless of their service.

Lubrication

Minimum wear of moving parts can be assured only by using the correct amount of the proper grade of lubricating oil. Too much oil, even of the best grade, will eventually gum piston rings and cause them to stick in the grooves, thus reducing the capacity of the compressor due to piston ring leakage. Excessive wear on the cylinder walls may also result because the wire-drawing of the gases between the piston and cylinder wall will scour off the lubricating film and permit a metal-to-metal contact. The excessive oil will also collect on the discharge valves and carbonize on the hot seats, permitting the valves to leak. In sufficient lubrication will naturally cause wear on piston rings, piston and compressor cylinder.

While there are no set rules governing the lubrication of compressor cylinders, each operator should set up his own standard to apply to individual requirements, the basis of which depends upon the gas being compressed and the nature of the oil being used. For example, when gases containing gasoline vapor or a large percentage of hydrocarbons are being compressed, a lubricant insoluble in the gas should be used. Such lubricant may be a soap solution, castor oil, or a blend of castor and petroleum oil.

It is good practice to remove a cylinder head occasionally to check the condition of the cylinder wall and make sure the cylinder is receiving the proper amount of lubrication.

Valves

All compressor valves, whether plate or poppet type, should be thoroughly overhauled so that the valves will close tightly when installed in the cylinder body. A leaking valve soon heats the valve and its surrounding area to a temperature considerably higher than the operating temperature for which the unit was designed. Excessive heat thus generated will warp the plates of the plate valves, resulting in even greater leakage, or in case of a poppet-type valve, will cut and destroy the valve seat and face.

Piston Rings

Rings should be free in the ring grooves but should not have excessive play. Each ring should be fitted individually to the compressor cylinder bore so that expansion of the ring under normal heat will not butt the ends together and force the ring out against the cylinder wall to cause undue wear.

Cooling Water

Compressor cylinder jackets should be kept clean and free from scale. The water used to cool compressor cylinders should be of a composition that will prevent excessive scaling in the jackets at the normal operating temperature of the compressor. All foreign matter such as mud, grit and similar substances should be removed from the water before it is circulated through the jackets. The amount of water, however, should be so regulated that the cylinder jacket and liner are not cooled to an abnormally low temperature as this condition will decrease the clearance between the hot compressor piston and the cylinder wall, thus inducing a sticky piston. A temperature differential of about 20 degrees Fahrenheit should be maintained between the incoming and outcoming water. If the incoming water is too cold it should be corrected by bringing the temperature to at least 70 degrees Fahrenheit.

Loading

Under today's conditions, when restrictions hold up delivery of replacement parts or make them unobtainable in some instances, cylinders occasionally may have to be used for pressures exceeding those for which they were designed. In such cases, extreme care should be exercised to keep the working pressure at or below that stipulated by the manufacturer of the cylinder. If the cylinder is to be used for pressures other than those for which it was intended, it is good policy to consult the manufacturer for his opinion as based on the changed operation conditions. Such practice will avoid damage to either the compressor or the mechanism which drives it.

Compression Ratios

Compression ratios should be kept as low as possible to prevent overheating compressor cylinders. While overheating may not always damage the compressor cylinder, it might result in a temperature higher than the flash point of the lubricating oil, in which case fires or explosions may occur, particularly in compressors operating on air.

Overheated conditions also lead to excessive carbon deposits in piston ring grooves and on valves. A high ratio of compression in a compressor built for a low compression ratio, may also overload the piston rod and running gear.

Cleanliness

As with any piece of machinery, the compressor should not only be kept clean but the operator should take steps to be sure the gas being compressed is as clean as practicable. Gases containing dust or other abrasives will soon wear the compressor piston rods, rings and cylinder walls to such an extent that the compressor will require reboring and complete overhauling long before the normal time set for such operations.

Corrosion

If the gas to be compressed contains any of the corrosive gases such as hydrogen sulfide, the manufacturer should be consulted for his opinion as to whether the compressor can be operated satisfactorily for such service. Many times a few minor changes will render a standard compressor suitable for compressing highly corrosive types of gases.

Careful attention to the foregoing simple but important details will help greatly to assure peak operating capacity of compressor installations with a minimum of maintenance time and cost.

The Electron Tube—

Genie, Gremlin or Jeep?

By W. D. COCKRELL, Engineer, Electronics Section, Industrial Control Division, General Electric Company

On closer acquaintance, electron "monsters" lose most of their frightfulness, and turn out to be friendly, rugged and reliable

THE average industrial engineer, unfamiliar with electronics, who glances through almost any magazine today, technical or popular, is apt to be overawed by the promises of electronic things to come. It is quite likely that his first impression will be that the electron tube is nothing short of a genie straight out of the Arabian Nights—a superhuman spirit of fantastic complexity and far too elusive for the average mortal to comprehend.

Or he may take the opposite viewpoint. These odd-looking electron tubes must fit into a class with the gremlins, mischievous little sprites, capable of much good, but more evil, and definitely to be shunned for as long a period as possible.

But on closer acquaintance, this electron "monster" loses most of its frightfulness, and turns out to be a friendly little jeep, rugged and reliable, capable of taking a terrific beating with minimum attention, while doing a man-size job.

Like the jeep, the electron tube can do its job 100 percent, but it cannot win the war unless the rest of the army pitches in to do its share. The rest of the "army" consists of the infantry of rheostats, transformers, and capacitors; the artillery of motors, generators, and amplidynes — all old friends, but perhaps not quite so quickly recognized under the speeded-up operations of this new mechanized warfare.

So let's all be good sports and not be too quick to condemn this electron "jeep" if the whole show does not come off as scheduled. Perhaps the break occurred at an entirely different part of the front. Did you ever shoot trouble for an hour and then find a blown fuse? That has happened on electronic panels, also.

What Are Electron Tubes, Anyway?

Are tubes hard to understand? Anyone who understands the use of the simplest copper-oxide rectifier, the rheostat, and the direct-current voltmeter, can become a tube expert after one easy lesson—well, anyway, he will know as much about an electron tube and how it functions in an industrial circuit, as many of us need to know.

In the first place, every true electron tube is a rectifier—composed of at least two elements or electrodes enclosed in a vacuum envelope made either of glass or of metal. One of the two principal elements of each tube is called a "cathode." The cathode is made of special materials, and is heated, usually by a small electric heater, to release electrons—those fundamental particles of negative electric current.

In high-school physics we learned that anything charged positively attracts a negative charge. Then, in the next lesson, we learned that if the charge is negative, other negative charges are repelled. Thus, if we connect the other principal tube element, called the "anode," to a power source so that it is positive with respect to the cathode, the anode will attract the electrons from the cathode. But if conditions are reversed, and the cathode is positive and the anode negative, no electron flow will take place, because the anode is so made that it will prevent the loss of electrons. Thus, we get the one-way valve action of rectification; the electron flow (or the negative current flow, if you like to think of the normal current flowing from positive to negative) can move in but one direction through the tube — namely, from cathode to anode.

But that is not all. In these days of commando tactics, we are taught that it is most effective to kick a guy when he is off balance, or sock him when he is not looking. In a similar manner, if we can catch the current passing from cathode to anode in its simplest state, as a stream of electrons, we can control it with the greatest of ease. For instance, the electrons in an ampere-second of current weigh about a billionth of an ounce, something a lot easier to push around with a small control power than even the smallest and lightest switch or contactor. The control element added to the electron tube for this purpose is called a "grid," which is usually a spiral or grate of fine wires placed between the cathode and the anode. If the grid is held at a negative potential, with respect to the cathode, it tends to repel the electrons passing by it on their way to the anode, thus cutting down the flow of current, or possibly preventing it altogether. So long as the grid is negative, it pushes the negative electrons away, and thus collects no electrons to itself. No electrons means no current, and no current—even with a large impressed voltage—means no power. And to be able to control current without the use of power is a neat job.

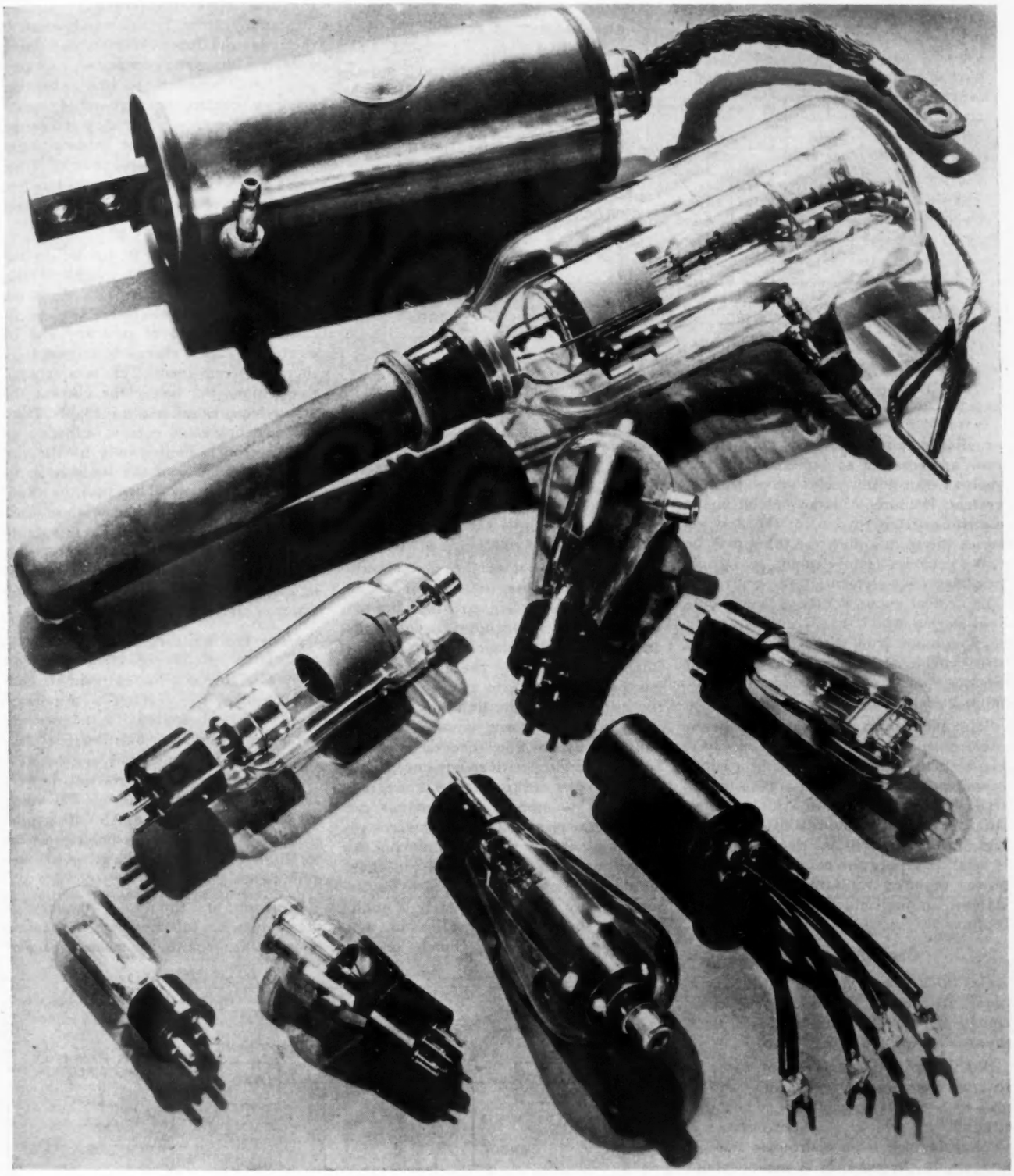
Of course, if we make the grid positive, it will assist the flow of electrons to the anode and a larger current will flow, but only at the expense of some electron current to the grid. With the grid negative we can have control power for next to nothing.

Types of Tubes

The electron tubes that are used in industry may be divided roughly into three groups: phototubes, high-vacuum tubes, and gas-filled tubes.

Phototubes

A phototube is a simple two-element rectifier in an evacuated glass bulb. The cathode is not heated to release the electrons, but is made of material which releases or "emits" electrons as light strikes it. These electrons can then be attracted as a small negative electric current to the positive anode. The number of electrons which should be kicked out of the cathode material when light strikes a small cathode would not be very large. We are lucky to get a millionth of an ampere, in most cases; and under certain conditions, the current is much less. In fact, the output is so small that in order to make use of it, we must boost it up or amplify it with a pliotron or thyratron, in order to operate even



Tubes used in industrial electronics equipment. Included are the ignitron, pliotron, kenotron, thyratron, phanotron and phototube.

the smallest practical relay or motor.

Phototubes are the "electric eyes" of industry. Responding to a shadow or a flash of light, they may be used to count people, food, freshly painted articles, and other things which it is not desirable to touch, as well as to perform many other simple switching applications. In more advanced equipments, they can check or compare colors, read high temperatures, and control very rapid and accurate movements through the weightless and wearless light beams. The potential uses of the phototube are limited only by man's imagination.

Vacuum tubes which are simple rectifiers, and which have but two principal elements—the electron-emitting cathode and the collecting anode—are called kenotrons, or "diodes" ("di," indicating "two"). If we add one grid for the control of the electron stream, it becomes a "triode." All high-vacuum tubes with one or more grids are called pliotrons,

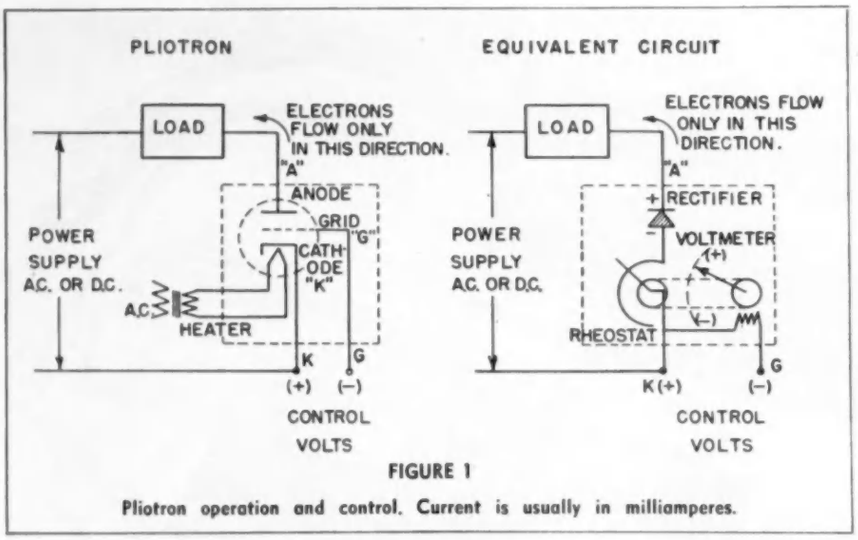


FIGURE 1

Pliotron operation and control. Current is usually in milliamperes.

or simply, amplifier tubes. Sometimes they are referred to by their function, such as transmitters, oscillators, or converters. If more grids are added in the electron stream to control the flow, as series valves in a pipe, the tubes may be called tetrodes (four-element, two-grid), pentodes (five-element, three-grid), etc. The typical vacuum tube is a low-current device which has a comparatively high voltage drop within the tube, yet it is capable of extremely fast and continuous control of the current with minimum grid power.

The pliotron is the familiar tube in radio receiving sets. Its role of amplifying a small signal or supplying a small output power is just as useful in industrial devices. Because of its characteristic of continuous control at extremely high frequencies, in the larger sizes it is used to supply the many kilowatts of power required for large broadcasting stations, or for induction and dielectric heating.

Gas-Filled Tubes

Gas-filled tubes, if used as rectifiers only, are called phanotrons; if they contain control elements, they are called thyratrons or ignitrons.

A thyratron tube has a hot cathode to emit the necessary electrons, and a grid to prevent current flow, when desired. However, it also contains mercury vapor, obtained from a drop or two of mercury in the tube, or it may contain inert gas, such as argon or xenon at low pressure. The gas or vapor helps to cut down the high internal voltage drop found in the pliotron. A constant voltage drop of about 15 volts is held for any value of current within the ability of the cathode to supply electrons. (This is done by a process called ionization.)

Because of this low drop, a thyraton of a particular size can be rated for a continuous current of 10 to 20 times that of a pliotron of the same physical size. Thyratron current ratings run into amperes; most of the pliotrons with which we deal will carry continuously only a few milliamperes.

But gas filling does have a few drawbacks. For instance, the maximum voltage of the controlled circuit is limited, but it is still well above the usual industrial control voltage range. Of more importance to us is the fact that the gas prevents the grid from controlling the current after the flow has once begun. In other words, a negative grid will prevent the flow of current as the anode is made positive; but once it has permitted the electron arc to start, it is powerless to stop it. The current can then stop only as the anode power is removed, or, in any a-c circuit, during the a-c voltage negative cycle. Even then, the deionization time required to regain control may be approximately a millisecond; therefore, thyratrons do not operate at frequencies much greater than the commercial power frequencies.

The thyratron is the handy-man of the industrial tubes. It controls meters, energizes magnetic contactors, and supplies small amounts of heat whenever accurate control or high-speed operations are required. Operating indirectly, by controlling generator fields or saturable reactors, it can control large amounts of power—many hundred horsepower or many kilowatts—for heat or lighting.

The ignitron tube is similar to the thyratron in that it is a gas-filled tube, but it differs in that its cathode is not heated to free the electrons. Instead, its cathode is a pool of mercury and its electron-emitting energy is derived from the arc stream itself. This is a cumulative action—the larger the current the more electrons are made available. Thus, the instantaneous current capacity of the ignitron is limited only by the size of the elements and the leads to carry the heavy current. This may be thousands of amperes. The continuous current rating is determined by the ability of the tube to dissipate the heat losses. The larger sizes of ignitrons have built-in water jackets through which cooling water is circulated.

Since the ignitron, unlike the thyratron, does not have electrons immediately available at a hot cathode, its control element, the "igniter" — a pointed piece of crystal dipping into the mercury pool—must actually "blast" a few electrons loose from the mercury to start the arc stream. This requires real power; as much as 40 amperes at 200 volts, for a few microseconds. So it can be seen why the ignitron is most practical for high currents and large power requirements.

Ignitrons are the heavy artillery of the industrial tubes. They are called upon to control the thousands of am-

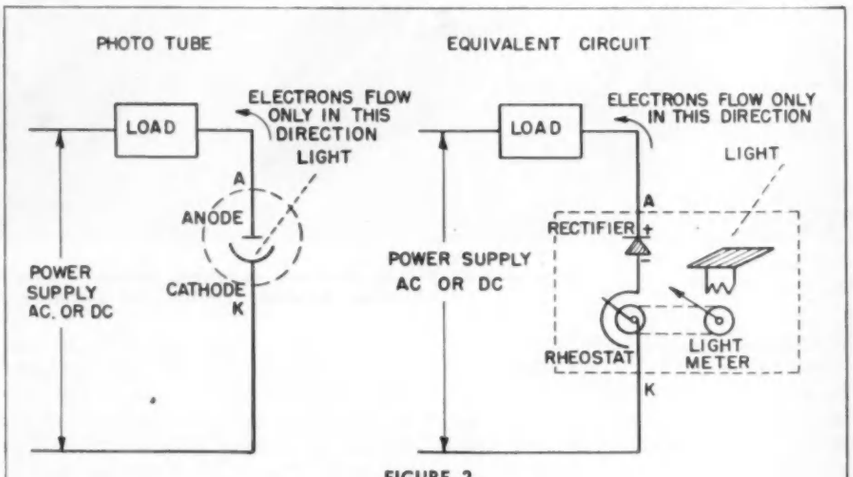


FIGURE 2

Phototube operation and control. Light controls a flow of microamperes.

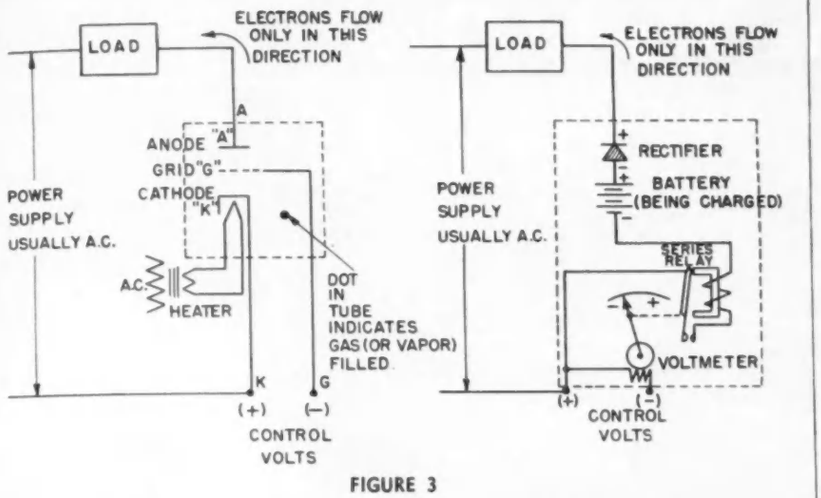


FIGURE 3

Thyratron operation and control. Current rating is usually in ampere.

peres required for resistance welding. They rectify and control the large amounts of power needed for the manufacture of aluminum, in electrochemical processes, and for steel-mill and factory direct-current shop voltages.

To sum up briefly, the phototube, using the energy of light to release electrons from its cathode, has so small an output in microamperes that a pliotron or thyratron must be used to amplify it to a useful value. The output of the pliotron (milliamperes) is sufficient to operate small relays, or to control a thyratron. Thyratrons, in turn, control amperes to operate large contactors, or motors in the usual control sizes from fractional horsepower up to 5 horsepower or more, or to control ignitrons. Ignitrons can handle hundreds of amperes, but require a reasonable amount of control power for operation.

How the Tubes Work

We said before that anyone who can understand a rectifier, a rheostat, and a voltmeter can understand tubes.

Take any kind of rectifier—copper-oxide or selenium—anything that will pass current in one direction and stop it in the other. Connect a rheostat in series and drive it by a voltmeter element, the positive terminal of which is connected to the negative terminal of the rheostat. Gear the rheostat to the voltmeter element in such a way that more negative voltage will cut in more resistance (see Figure 1). The rheostat is stepless, and goes to infinite resistance or open circuit at the high end. It is assumed that the voltmeter and rheostat can move extremely fast, 100,000,000 times per second; and the voltmeter is of extremely high resistance, perhaps a megohm or more.

This simple circuit can be used to replace a triode pliotron in any industrial circuit, and will do exactly the same job. If the tube is a tetrode or pentode, other series rheostat-voltmeter combinations may replace each grid.

For a phototube, simply replace the voltmeter with an exposure meter so that increased light on the sensitive surface will move the meter element to cut resistance out of the rheostat (see Figure 2).

As for the thyratron and ignitron, they are no more complicated. In series with the rectifier we place a battery of about 15 volts and so connect it that it will be charged by the current which the rectifier permits to pass. (This corresponds to the constant arc drop of the thyratron for all current values.) Finally, in the circuit is a series relay that is connected to "seal-in" or "lock-in," when the circuit is completed through its own single, normally open contact. The relay armature is moved, and this contact is closed mechanically by the action of the control voltmeter (just as the rheostat turned, in the description of the pliotron). The contact moves to close as the voltage becomes less negative (see Figure 3).

Once the contact has closed, however, the holding power of the series relay is so great that the small voltmeter torque is powerless to open it again until the current has stopped flowing.

The ignitron equivalent is about the same, except with larger power, and the size of everything becomes larger. In place of the voltmeter, we can use a small solenoid. A rectifier in series with the solenoid, to permit current to flow in but one direction, may not be necessary in our electromechanical picture, but it is necessary in the ignitron circuit to prevent injury to the igniter by reverse current (see Figure 4).

And that completes our one-lesson course on the industrial electron tube. We do admit that a few of the details about as essential as trouser cuffs and pocket flaps, have been omitted. But the fundamental facts are here, and we would like to prove it in this way. If you ever run into a wiring diagram that features one of these mysterious electron tubes that has been worrying you, do this: Before you lose any sleep or even get a vitamin B deficiency, just tear off a piece of an old war bond or ration book, paste it neatly over the offending tube symbol and draw thereon the appropriate equivalent symbol in a bold and steady hand. Then go right ahead and forget that electrons exist.

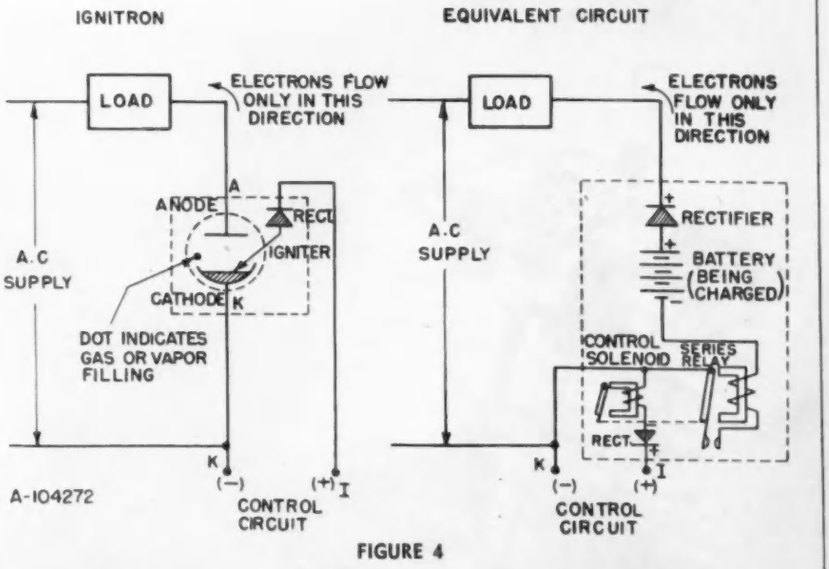
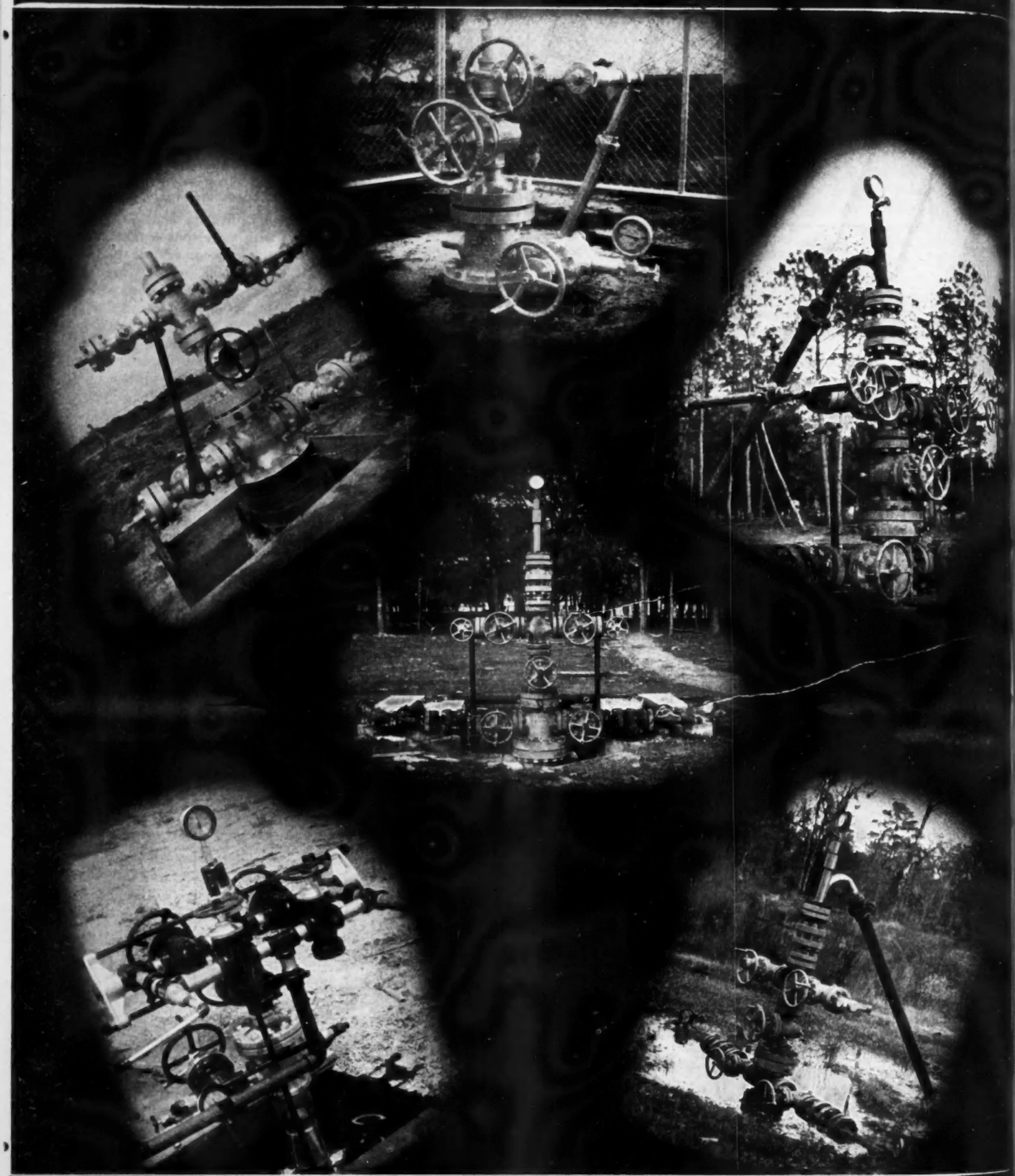


FIGURE 4

Ignitron operation and control. Current may be hundreds of amperes.

McEVOY CHRISTMAS TREES

The World Over



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☆ ☆ ☆ ☆ WASHINGTON ☆ ☆ ☆ ☆ ROUNDUP

ADJOURNMENT of Congress and the departure of as many officials as could get home for the holidays made Christmas week quiet in Washington, the only development of major interest being the appearance of Lieutenant General Brehon Somervell before the Truman committee to give his version of the Canol project.

Somervell indicated that the joint chiefs of staff now have made the Canadian oil development a feature of the grand strategy for the defeat of Japan and that approval for a major expansion of the undertaking will be sought early next year.

While the chief of the Army service forces made a strong defense of the project, which was disclosed to have been given the approval of President Roosevelt, a majority of the committee was represented as still believing it was unwise and unjustifiable. However, a committee report on Canol which was scheduled for publication immediately following the hearing, was held up and its condemnation of the venture may be modified in the version which now is due for release about the first of the year.

Somervell Says Oil from Canol To Play Important Part in Japanese War

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Week Very Quiet as Washington Prepares for Holidays

»

By B. F. LINZ
Washington Correspondent

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Adjournment of Congress left the Disney oil-price bill among the controversies to be taken up when the new session opens January 10. Until then it will rest in the files of the Senate committee on banking and currency to which it was referred following its passage by the House December 13. The bill is one of several on which Congress and the Administration are at loggerheads.

Somervell Defends Canol Project as Justified Although Not Economical

The Army's $130,000,000 Canol oil project has been incorporated into the general strategy for the winning of the war with Japan and approval will be sought in the near future for its expansion by a large but unspecified sum, it was indicated December 20 by Lieutenant General Brehon Somervell, chief of the Army Service Forces.

The general outline of the part to be played by Canol was given the Truman Committee in confidential session before Somervell appeared at an open hearing, to make a strong defense of the project as a desperate resort adopted when the military fortunes of the United States were at their nadir.

Somervell declared the work of the department had discovered "the biggest oil field uncovered in the last 15 years in the North American continent," but later admitted he was wrong after Senator E. H. Moore of Oklahoma read a list of 20 larger discoveries made between 1927 and 1943, including the East Texas field.

May Modify Report

The Army chief's defense of Canol and his previous disclosure of its intended use served to delay and may modify a highly adverse committee report which Chairman Harry S. Truman of Nebraska was all set to release immediately following the hearing, before Congress adjourned. The report now is not expected to be issued until after the turn of the year.

Somervell told the committee that the controversy over Canol seemed to him to revolve around five points: Whether the decision to execute the project was a sound one; whether the project is feasible; whether the work has been done competently; whether it is desirable to continue or enlarge the project, and whether the interests of the Government are protected, and procee 'ed to deal with them seriatim.

Desperate Days

Tracing the situation which led to adoption of the project, he recalled the unbroken series of disasters which the United States and England experienced in the early part of 1942, declaring those "were desperate days" when Guam, Wake, Hong Kong, Manila, Singapore, Java, Rangoon and Bataan fell one after the other and the Japanese twice shelled our West Coast and succeeded in gaining footholds on Attu and Kiska.

With the Japanese rapidly possessing themselves of the oil resources of the Far East and threatening our own oil installations on the Pacific Coast, where they had shelled a refinery, the need for new sources of oil was imperative, both in the South Pacific and in our own Northwest, where a need for fuel was foreseen for the trucks traversing the Alcan Highway which had just been authorized.

Accordingly, after a survey of possible sources, Somervell continued, the War Department, on April 29, 1942, issued orders for the drilling of wells in New Zealand where two prospects existed, helping the Superior Oil Company, which owned the land, with priorities and materials, and for the undertaking of the Canol project. No oil was found in New Zealand and the Army pulled out, he said.

The size of the Canol operation, he said, was fixed on the possibility of getting oil, the size of pipe that could be obtained without inroads on our limited steel supply and the size of a refinery that could be picked up secondhand.

Thoroughly Discussed

Denying that the top officials of the Army had not been consulted, Somervell pointed out that at the time he was chief of the General Staff group that considered oil matters and said that the project was thoroughly discussed throughout the department. He explained that the War Production Board was not consulted because it had no jurisdiction over operations outside the continental United States and at that time had no organization in any position to give any assistance. For the same reasons, he added, the Petroleum Administrator was not consulted, but the department had all of the data available in the Geological Survey and Bureau of Mines and there were no production men in PAW who could have furnished any "worthwhile advice."

"In short," he said, "there was urgent and even desperate need for the oil in the general location of the Alcan Highway, the oil was at the Norman Wells, and it was of excellent quality but of undetermined amount. We were on the defensive, our shipping was dwindling rapidly and there was no relief in sight for an indeterminate period. The conclusion that the project should have been adopted at the time, even on hindsight, seems inescapable."

Somervell related that the hazards of the project were played up "very vividly" by Administrator Ickes and the oil companies and "everybody who ever ran a cigar store in Alaska told us we couldn't do it."

The department, he said, was told no great amount of oil would be developed, but up to 100,000,000 barrels has been staked out; that the line could not be built, but it has and filling was started December 18; that the oil would not flow, but it has a pour point of —72° and the average temperature of the area is —25°, and that the line could not be maintained in winter, but the Skagway-Whitehorse line began operations January 20, 1943, and the only break so far experienced occurred last May.

Somervell explained that the job could have been finished sooner than is now planned, but that when the military situation in Alaska began to improve

the work was slowed up, the basis for the original haste being the fear that the Japanese might gain a foothold in Alaska.

Important Role

Recently, he said, the Chiefs of Staff considered the position of the Northwest in the strategy, deciding that the project was essential, and have reviewed the matter in the light of the recent conferences in Cairo and Teheran and "have strengthened the position they have taken" that Canol will play an important role in the winning of the war.

It was also indicated that the matter has received the approval of President Roosevelt, expressed in an interchange of letters with Ickes, of whom he apparently had made inquiry. Further, Somervell disclosed, Economic Director Byrnes recently asked the Army, Navy and WPB to confer in an effort to expedite the completion of the high-octane program, which now is behind schedule.

"It would be the height of folly to throw away this supply which is in our hands after months of effort and after practically all the materials have been assembled and the workmen on the job in this inaccessible place in the Northwest," he insisted.

Somervell explained that of the $24,000,000 estimated as required to complete the project, only $10,000,000 will be spent on the plant itself; $8,500,000 being earmarked for further exploration of the field and $7,000,000 for "demobilization" after the job is finished, when it will be necessary to clean up and bring back the 10,000 civilians who are working in Canol.

He told the committee that $5,500,000 is to be spent in exploration in the southern part of Alaska in cooperation with the Interior Department, but asserted that even if oil is found it would be 12 to 18 months or longer before any supply could be developed. The department, he said, also is urging development of oil resources in Persia, Arabia, Burmah and the East Indies, and the Government has lend-leased equipment to the amount of $125,000,000 to the Russians and British to get oil.

"To me, there is no question of completing the project," Somervell declared. "The only question is one of expansion. It is quite possible that approval for expansion will be sought within a relatively short time."

U. S. Protected

Somervell denied that the contracts under which Canol was prosecuted do not protect the interests of the United States, explaining that all contained provisions for review. The contract with Imperial Oil Company, owner of the Norman Wells field, is being renegotiated now, as are the contracts for construction of the facilities, and the agreements with the Canadian Government are subject to review at any time and negotiations have already been opened to that end.

Not Economical But Justified

Under questioning by the committee, the General admitted that the project was not economic and pointed out that it was not planned as a commercial undertaking. Asked if he would undertake it if the situation existed today, he declared emphatically that he would, but on the basis of a 20,000-barrel refinery and correspondingly larger pipe line.

The refinery now being completed, to come into operation next March, will have a throughput of 3000 barrels daily. Of that, 800 barrels will be required for operation and the remaining 2200 barrels will produce 479 barrels of 100-octane and 1048 barrels of truck gasoline, 400 barrels of Diesel oil and 293 barrels of Houdry charge stock and residual. There will, however, be no Houdry unit at Canol, and Somervell said he would explain the reason for substituting a thermal plant, in secret session.

With respect to production, Somervell said that wells already acidized have a proven potential of 4800 barrels daily and if the other wells already drilled are acidized an output of 7500 barrels could be realized. If the field actually proves to have the 100,000,000 barrels now estimated for it, development facilities will be materially expanded, he indicated.

Told by Truman that the Secretaries of the Navy and Interior have recently recommended the immediate abandonment of Canol, Somervell insisted the project was fully justified by the results and should be completed.

Roosevelt Approves

At his news conference December 21, President Roosevelt came to Somervell's defense, saying that he had approved it and, at the time it was started, would have approved anything to get a new source of oil for Alaska and the Aleution Islands. Today, he said, he regards the project as a war measure. Asked if he knew the cost at the time he approved it, the President said he thought he did, but apparently could not recollect the figure.

Strongest defenders of the project on the Truman Committee are Senators Tom Connally of Texas and Carl A. Hatch of New Mexico, who attended the hearing for the purpose of giving Somervell support.

Some of the other members of the committee are understood to have lost some of their opposition to the project as a result of Somervell's testimony, but Truman himself and a majority of the committee appeared to be still opposed, the chairman commenting that "it hasn't changed my mind that this is a bad, bad project, undertaken without an estimate of cost and the time required to complete it."

Government Going Out Of Scrap Rubber Business

The government will go out of the scrap rubber business at the end of the year, Secretary Jesse H. Jones announcing that Rubber Reserve Company will discontinue the purchase of scrap rubber on December 31.

So far, Rubber Reserve Company has purchased more than 1,000,000 tons of scrap rubber, by far the greater part of it through the oil industry, and now has a stockpile of 350,000 tons, which Jones said will be liquidated "in a manner designed to least disturb the collection and sale of this material by private enterprise."

"Jones Pays the Freight" On West Texas Oil

Compensation at rates ranging from 60.67 cents to $1.3276 per barrel will be paid by Defense Supplies Corporation on West Texas crude oil moving to District 2 refineries by railroad tank car, under a schedule announced December 21 by Secretary of Commerce Jesse H. Jones.

The approximate compensation to be paid, based mainly on the difference between pipe-line tariffs and costs of transportation by tank car, are set forth in the schedule for movement between Levelland, Midland and McCamey, Texas, and 74 destinations in the Middle West.

As previously announced by Jones, the compensation is to be paid only to refineries not in the excess-profits bracket on some 40,000 barrels of West Texas sour crude shipped to utilize excess refining capacity in District 2.

Tanker Construction Program Trimmed

Tanker construction in 1944 will be cut back from original programs, the first step in that direction being taken by the United States Maritime Commission December 21, when it canceled a contract for 48 tankers to be built by the Kaiser Company, Inc., of Vancouver, Wash., and substituted an order for 27 Victory ships.

The change-over was explained as in keeping with the request of the Joint Chiefs of Staff for additional tonnage of the Victory ship type, to provide which it will be necessary to curtail the tanker construction program.

The decision to eliminate some of the oil carrier construction is seen as indicating that the tanker situation has improved to the point where adequate tonnage for all prospective needs is now considered assured. For well over a year, tanker building has been pushed with all possible speed, in an attempt not only to replace the ships sunk by submarines but also to develop transportation to carry oil and products to all parts of the world in which our Army and Navy are operating.

11 More Aviation Gasoline Plants Completed

Eleven more 100-octane gasoline plants have been completed within the last 90 days and are now in production, PAW announced December 22.

The new plants bring the total of completed 100-octane plants to 34, and represent about $71,000,000 of the $900,000,000 building program, Ickes said. Thirty-eight more plants are scheduled for completion early next year, and another 22 are to be started.

The building of the new aviation gasoline plants has been marked by the adoption of substitutes and expedients to offset the shortage of critical materials. Items which could not be secured from manufacturers on time were made in the maintenance shops of the oil companies themselves, much second-hand equipment was used, specifications for equipment were simplified, storage tanks were dismantled and moved, and where possible steel was substituted for alloys, and lighter weights of steel were used.

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Texas January Allowable Set Slightly Above Figure Set by PAW as Necessary

An allowable of 2,044,748 barrels daily for Texas is provided in the railroad commission order for January. This is the estimated production after deductions are made for shutdown days and under-production, and the distillate and natural-gasoline production has been added. This is 26,748 barrels daily in excess of the PAW recommendation of 2,018,000 barrels per day.

The commission has scheduled 23 producing days for most fields including the East Texas field. The comparative figures by district are:

District	Wells Dec. 18	Allowable Dec. 18	Estimated Allowable January 1
1 SW	3,607	24,626	24,774
2 SW	2,847	140,771	141,994
3 GC	8,105	508,255	506,523
4 SW	8,060	188,521	192,375
5 EC	1,752	41,835	44,170
6 EC	2,324	95,319	91,812
E. Tex. Field	25,126	372,113	371,709
7B WC	6,905	28,986	29,433
7C WC	1,291	19,989	20,550
8 WT	14,533	351,942	368,301
9 NT	20,073	131,025	137,578
10 Pan.	5,685	108,589	109,566
Total	100,308	2,011,971	2,038,785
Less Underproduction		6.34	129,259
			1,909,526
Distillate & Natural Gasoline			135,222
Estimated Production			2,044,748
PAW Certification			2,018,000
Texas Over			26,748

The principal changes by fields followed recommendations made at the statewide hearing December 17. The changes by fields are:

Field	December 11 Net Allowable	January 1 Net Allowable
Pettus	368	496
Tom O'Connor	44,085	41,881
Oyster Bayou	5,760	6,210
Clear Lake	6,013	5,431
Segno Deep	3,983	3,000
Sugarland	10,000	9,032
Webster	59,809	54,021
Agua Dulce (River Sand)	220	300
Richard Kind	3,198	2,800
Rincon	7,124	7,500
Tom Graham	1,506	1,000
Hawkins	31,226	24,130
Clara Couch	75	200
Abell	3,807	4,300
Foster	12,570	14,752
Seminole	14,416	20,000
Waddell	2,348	4,486
Panhandle	108,468	109,566

There were a few changes in the shutdown pattern, the following fields being added to those producing 23 days:

District 2. West Mauritz, Harmon, and Mayo.

District 3. Amelia, Clear Lake, Sugarland, Webster.

District 4. Orange Grove.

District 9. Antelope (Miss. lime), Bindell, Bonita, Chapman-McFarlin, Clingingsmith, Cooper, Hapgood, Hoefle, Kadana, Kadane Shallow, Markins, Mueller, Knox (Miss. lime), Ringgold, Sanders, Scotland, Scotland (Miss. lime), Wilson, Forestburg, Worsham-Steed, Rock Crossing (Ellenburger), Padgitt (Miss.).

District 10. Panhandle.

25 producing days: Emperor and Goldsmith in West Texas; Seymour in North Texas.

26 producing days: Coke in East Central.

19 producing days: Tom O'Connor in District 2; Slaughter and Wasson in District 8.

17 producing days: Hawkins.

Exempt from all shut downs:

District 1. Darst Creek, Green Branch, Loma Alto, Luling-Branyon, Pearsall (Navarro sand), and Salt Flat.

District 2. Blanconia, Cordele, Fagan, Ganada West, Goebel, Heyser, Hondo Creek, Little Kentucky, Mauritz, Mellon Creek, Mission River, North La Rosa, Oakville, Pettus, Plummer, Poth, South Caesar, Tynan, White Creek and Victoria.

District 3. Alief, Arriola, Bammel, Barber's Hill, Batson New, North Bay City, Beaumont West, Boling, Buckeye, Cedar Point, Cistern, Clay Creek, Danbury Dome, Danbury Dome (5655-foot sand), Esperson Dome, Eureka Heights, Fannett, Goose Creek, Hastings, High Island, Hitchcock, Hull, Humble, Humble Light, Humble Deep, Kirby, Kubela, Livingston, Lochridge, Louise, Magnet-Withers, Manvel, Oligocene, Markham, Mercy, Mykawa, Mykawa New, North Katy, North Withers, Orange West, Oyster Bayou, Pinehurst, Port Neches, Port Neches West, Raccoon Bend, Raccoon Bend Cockfield, Red Fish Reef, Sandy Point, Silsbee, Silsbee West, South Houston, Stowell, Thompson, Thompson South, Turtle Bay East, West Columbia, and West Columbia New.

District 4. Agua Dulce, Agua Dulce (Sponberg, Harper, and Rivers sands), Armstrong, Boyle, Cameron, Casa Blanca, Charamousca, Clara Driscoll (3800-foot sand), Eagle Hill, Garcia, Guerra, Kelsey, Kreis, Labbe, Minnie Bock, Moca, Nichols, Lockhart, North Magnolia City, North Rincon, Robinson, Ross, North Sun, Plymouth, Sam Fordyce, North Sam Fordyce, Seeligson (Zone 13, Zone 14, Zone 17, and Zone 20-E), Sejita, Seven Sisters, Strake, Southland, Taft, Tarancahaus, Weil, White Point, East White Point, and Yeager.

District 5. Bazette, Campbell, Flag Lake, Mecia, Powell, Richland, Sadler, Sulphur Bluff, Wortham, and Weiland.

District 6. Boggy Creek, Cayuga, Henderson (Rusk County), Kildare, Lone Star, New Hope, Pittsburg, Quitman, Rodessa, and Talco.

District 7B. Brownvville, Eastland County, Erath County, Hill (Miss. lime), Loving, McCaulley, Merkel, Reddin-Frazier, Reddin, Stephens County.

District 7C. Beddo, Big Lake, Clara Couch, Shannon, World, Winters.

District 8. Apco (1600-foot), Clabberhill, Crane Cowden, Embar (Ellenberger), Fullerton, Halley Extension, Hendricks, Howard-Glasscock, Latan-East Howard, Latan North, Jamison-Pollard, Kermit, Kermit (Ellenberger), Keystone, Ellenberger, Keystone Holt, Leck, McElroy, McKee, Mason, Masterson, Masterson (3500-foot), Monahans, Monroe, Russell, Sand Hills West, Snyder, Taylor Link, Tobarg, Union, Vincent, Welch, Westbrook, Wheeler, (Ellenberger), White & Baker (Lime), and Yates.

District 9. Airport, Allar (Caddo), Antelope, Bindel (Ellenberger) Burns, Eckert, Burns Ragland (Miss. Lime), Davidson, Dodson, Fargo, Fish Creek, Fleitmann, Holbert (Caddo), Hults-Owens, Johnson Pool in Cooke County, Joy (Miss. Lime), KMA Ellenberger, Knight, Meyers, McDonald, Murray, Murray Caddo, Mueller (Caddo), Burns-Midway, Peek, Rogers-McCrary, Stephens, Vogtsberger, Weir, West, Wolfe, Walnut Bend, and Walnut Bend Winger.

District 10. Bateman Ranch.

OPA Relaxes Ceilings on Sales to Government

Resellers of gasoline and fuel oil other than refiners, who submit bids to a Government agency, are permitted to add a mark-up of one-fourth of a cent a gallon above the ceiling price of the refinery from which the shipment is made, under an order issued by OPA December 20, and at the same time exempted 80-octane gasoline from price control.

To qualify the reseller for the mark-up, the sale must be the result of a contract made after competitive bidding, the bids must have been taken by the Government agency on an f.o.b. shipping point price basis, and the mark-up must not result in a laid-down cost to the Government in excess of the f.o.b. shipping point ceiling price of each person participating in the bidding, plus the cost of transportation to destination.

OPA officials expressed the belief that the order wil result in lower prices to the Government by encouraging the taking of Government orders by resellers who in the past have refused because they were unable to get a mark-up above their purchase cost. This has resulted in the Government having to pay some other bidder, from a different source of supply, a higher laid-down cost than it would be required to pay the reseller.

OPA also exempted from price control sales of 80-octane all-purpose gasoline to the Government or any of its agencies, acting on a request for such exemption made by the Army and Navy. Sufficient price control will be maintained, it was said, through the scrutiny of the departments of cost data submitted by sellers before contracts are negotiated. The two services will keep OPA informed of the prices at which contracts are negotiated.

OPA Sets Ceiling on Gas For Furnace Black

A ceiling price of 4 cents per thousand cubic feet, at a pressure of 16.4 pounds per square inch, has been ordered by OPA on sweet natural gas, without liquid hydrocarbon fractions extracted, produced in the Hugoton, Okla., field, when sold for use in the manufacture of furnace black, effective December 30.

Gas for furnace black, a product used in the manufacture of synthetic rubber, heretofore has been sold under a flat-price contract for 2 cents per thousand cubic feet, at a pressure of 14.4 pounds per square inch.

This contract now has expired, and the one purchaser and one seller are negotiating a new agreement. The new price at the increased pressure is equivalent to slightly more than the former 2 cents per thousand cubic feet, and will provide a ceiling in line with the level of prevailing prices to pipe line purchasers in the same producing area.

HARRY BALDWIN, of the geological department of Phillips Petroleum Company, Bartlesville, discussed the "Oil Industry In the Argentine" before a meeting of Nomads in Tulsa December 27.

Heating Oil and Residual Fuel Withdrawn From Storage Despite High Refinery Runs

Both crude oil production and refinery runs continued at almost the same levels in the week ended December 18 as in the previous week, but yields of the principal products were altered to provide increased production of residual fuel oil and somewhat reduced output of heating oil and gasoline. However, the production of residual still was much short of requirements, necessitating continued heavy withdrawal from storage; and the new supply of gasoil and distillate fuel also was inadequate, forcing a large draft on stocks; while there was only a normal or sub-normal seasonal building up of inventories of gasoline, as a result of the reduced production of that product.

Crude oil production in the United States averaged 4,364,000 barrels per day in the week of December 18, down 13,000 from the previous week, but only 72,000 under the all-time peak of mid-November, and 472,000 barrels per day or 12 percent more than output in the week ended December 19 last year.

Refinery runs of crude averaged 4,146,000 barrels daily in the December 18 week, up 2000 from the previous week, and within 185,000 barrels of the all-time peak of two weeks ago. The runs were 501,000 barrels per day or nearly 14 percent greater than in the week ended December 19 last year.

Stocks of crude oil were lowered 1,017,000 barrels in the week ended December 11, latest available figures showed, having come down to 240,148,000 barrels. That quantity was about 8,000,000 barrels or 3.6 percent greater, however, than the supply on hand at the corresponding time last year.

In totaling 12,240,000 barrels during the week ended December 18, production of gasoline was off 330,000 barrels, or about 47,000 barrels per day, from the previous week. It was, however, greater than in the corresponding week of last year by 1,610,000 barrels or 230,000 daily, an increase of 15 percent.

Stocks of finished and unfinished gasoline were increased 788,000 barrels (112,000 daily) in the week of December 18, having risen to 72,725,000 barrels. The new total was, however, less than the inventory of one year previously by 3,416,000 barrels or 4.5 percent.

Production of gasoil and distillate fuel totaled 4,387,000 barrels in the week of December 18, having been lower than in the preceding week by 249,000 barrels (35,000 daily). However, the production was greater than that in the corresponding week last year by 306,000 barrels (44,000 daily), or 7.5 percent.

Inventories of gasoil and distillate fuel were drawn upon in the December 18 week to the extent of 1,393,000 barrels or nearly 200,000 daily; and the remaining total of 44,117,000 barrels was about 3,000,000 barrels or 6.5 percent less than stocks December 19 last year.

Production of residual fuel oil in total-

Crude Oil Production in the United States

(Estimates compiled by The OIL WEEKLY. All figures indicate daily averages, in barrels)

STATE OR DISTRICT	PRODUCTION IN WEEK ENDED Dec. 25	Dec. 18
Arkansas	78,200	75,850
California	804,050	795,500
Long Beach	30,500	30,450
Midway-Sunset	55,550	54,400
Kettleman Hills	42,300	41,300
Wilmington	97,600	95,000
Rest of State	578,100	574,350
Colorado	6,550	7,600
Illinois	222,550	211,850
Salem	29,100	28,450
Louden	35,300	34,500
Other New Pools	146,350	137,100
Old Pools	11,800	11,800
Indiana	11,850	14,200
Kansas	268,300	271,800
Kentucky	21,000	26,450
Louisiana	353,950	354,200
North Louisiana	78,550	78,600
South Louisiana	275,400	275,600
Michigan	53,100	52,900
Mississippi	47,500	47,400
Missouri	90	95
Montana	21,500	23,025
Nebraska	1,600	1,650
New Mexico	113,000	113,050
New York	13,000	13,700
Ohio	9,000	9,450
Oklahoma	327,500	325,800
Oklahoma City	50,700	50,200
Seminole Area	72,000	71,100
Rest of State	204,800	204,500
Pennsylvania	36,900	40,800
Tennessee	35	35
Texas	1,894,350	1,895,000
Upper Gulf Coast	520,400	520,600
East Texas Field	364,000	364,350
Rest of Eastern Texas	127,000	126,800
Lower Gulf Coast	191,000	191,000
Southwest Texas	79,500	79,400
South Central Texas	20,500	20,500
West Texas	354,200	354,350
North Texas	143,500	143,500
Panhandle	94,250	94,500
Utah	12	10
West Virginia	8,600	9,000
Wyoming	89,050	96,450
Total United States	4,381,687	4,389,815

Trends of Operations and Changes in Stocks

Figures on crude stocks are from Bureau of Mines weekly reports; all others from American Petroleum Institute weekly reports, which are estimates on Bureau of Mines basis.
(All figures in thousands of barrels—add 000)

HIGHS AND LOWS OF RECENT YEARS

ITEM	Crude Oil Prod. Barrels Daily	Week Ended	Runs to Stills Barrels Daily	Week Ended	Crude Stocks Barrels	Week Ended	Gasoline Stocks Barrels	Week Ended	Gasoil & Distillate Stocks Barrels	Week Ended	Residual Fuel Oil Stocks Barrels	Week Ended
Highs:												
1939	3,910	8- 5	3,650	10-21	278,607	5-26	87,769	4-22	39,562	10-28	116,237	8-26
1940	3,890	3-16	3,690	6-22	265,865	8-31	102,817	4-20	49,051	10-19	109,135	9-14
1941	4,337	11-22	4,120	10-18	266,187	3-29	99,727	3-29	[1]54,983	11-15	102,448	1- 4
1942	4,337	2- 7	3,961	1- 3	263,208	3-28	[1]109,281	3-14	49,861	11-14	95,857	1- 3
1943	[1]4,436	11-13	[1]4,331	12- 4	245,752	5-29	94,159	3-20	46,187	11-27	72,881	1- 2
Lows:												
1939	[2]1,601	8-26	3,125	2-18	[2]229,127	10-12	71,152	10- 7	20,722	4-15	105,397	4- 8
1940	3,335	11-30	3,370	1- 6	237,339	1-27	79,847	11- 9	23,551	4- 6	102,344	2-10
1941	3,364	1-11	3,490	1-18	240,399	11-15	79,923	10- 4	28,381	4-12	90,914	7-12
1942	3,297	7- 4	3,393	5-23	231,896	12-12	75,934	12- 5	29,240	4-25	72,962	12-26
1943	3,821	1- 9	3,579	3-13	232,191	1- 9	68,182	10-16	30,732	4- 3	58,272	12-18

TRENDS OF 1942 AND 1943

Trends in Week Ended:	Crude Oil Production Daily	Runs to Stills Daily	Stocks Week End	Gasoline Production Weekly	Gasoline Stocks Week End	Gasoil & Distillate Production Weekly	Gasoil & Distillate Stocks Week End	Residual Fuel Production Weekly	Residual Fuel Stocks Week End
1942:									
January 3	4,038	3,961	244,440	13,797	92,987	3,855	49,357	6,918	95,857
January 31	3,871	3,848	250,740	13,292	97,810	3,817	40,674	6,640	91,189
February 28	4,016	3,675	259,373	12,131	105,635	3,799	34,547	6,813	88,285
March 28	3,820	3,667	263,208	11,663	105,624	3,661	31,756	6,344	83,045
April 25	3,581	3,506	257,073	10,535	102,897	3,267	29,240	6,869	81,107
May 30	3,877	3,522	255,023	10,478	95,355	3,034	31,384	6,993	79,628
June 27	3,719	3,581	253,364	10,713	88,396	3,549	32,851	6,615	77,304
July 25	3,691	3,658	249,262	10,864	82,281	3,647	35,966	6,796	77,816
August 29	3,964	3,697	249,007	11,300	80,831	3,850	42,060	6,875	78,034
September 26	3,909	3,802	242,785	10,954	80,550	4,215	45,954	7,094	78,943
October 31	3,901	3,731	239,266	11,153	79,159	.....	48,131	.....	79,166
November 28	3,878	3,736	234,850	11,269	78,854	.....	49,739	.....	77,796
1943:									
January 2	3,871	3,734	233,938	10,957	82,420	4,285	42,913	7,083	72,881
January 30	3,826	3,698	233,863	10,339	88,830	3,888	37,057	7,452	70,763
February 27	3,873	3,709	235,217	10,566	93,157	4,230	32,939	7,839	70,140
March 27	3,896	3,742	239,126	10,231	94,079	3,541	30,980	8,018	67,938
April 24	3,913	3,737	242,035	10,583	91,001	3,954	31,142	8,168	67,455
May 29	3,970	4,679	245,752	10,656	83,937	3,798	32,274	7,672	67,682
June 26	3,955	4,015	242,657	11,092	79,589	3,876	34,044	8,126	67,960
July 31	4,133	3,788	238,420	11,127	74,977	3,765	36,363	8,478	66,877
August 28	4,196	4,227	236,170	12,420	72,525	4,351	37,928	8,732	67,250
September 25	3,344	4,156	233,013	12,206	70,024	4,608	40,328	8,560	66,659
October 30	4,383	4,176	237,219	12,813	69,297	4,642	44,591	7,968	63,838
November 27	4,414	4,261	239,761	12,638	69,980	4,379	46,187	8,633	62,143
December 4	4,384	[1]4,331	241,165	13,325	71,040	4,714	45,107	8,348	61,420
December 11	4,377	4,144	240,148	12,570	71,937	4,636	45,510	8,151	59,715
Dec. 18, 1943	**4,364**	**4,146**	.....	**12,240**	**72,725**	**4,387**	**44,117**	**8,291**	**58,272**
Dec. 19, 1942	3,892	3,645	[4]231,896	10,630	76,141	4,081	47,165	7,201	74,449
Change:									
In week	—13	+2	—1,017	—330	+788	—249	—1,393	+140	—1,443
In year	+472	+501	+8,252	+1,610	—3,416	+306	—3,048	+1,090	—16,177
In year	+12.1%	+13.7%	+3.6%	+15.1%	—4.5%	+7.5%	—6.5%	+15.1%	—21.7%

[1] All time peak. [2] Lowest since April, 1922. [3] Lowest since October, 1922, due to shutdown of six Mid-Continent states. [4] Stocks, December 13, 1942.

ing 8,291,000 barrels during the week of December 18 exceeded output the week before by 140,000 barrels (20,000 daily). And it was greater than production in the corresponding week last year by 1,090,000 barrels (155,000 daily), or 15 percent.

Nevertheless, it was necessary to take from storage 1,443,000 barrels of residual fuel, an average of about 206,000 barrels per day. And the total of 58,272,000 barrels left in the tanks was approximately 16,000,000 barrels or 22 percent less than the 74,449,000 barrels on hand December 19 last year.

Crude Oil Output Declines Slightly in Week

United States crude oil production moved downward this week, ended December 25, to 4,381,687 barrels, a decrease of 8126 barrels as compared to 4,389,815 barrels the previous week.

Leading the decline with 7,400 barrels less was Wyoming. Kentucky, Kansas, Pennyslvania, Indiana, Colorado, and Montana followed in that order, also showing decreases.

States reporting increases were Illinois, with 10,700 barrels, California, 8550 barrels, Arkansas, 2350 barrels, and Oklahoma, 1700 barrels.

Other changes were minor.

Natural Gasoline Output At New High in October

A new record of 10,614,000 gallons daily was set in the production of natural gasoline and allied products in October, compared with 10,503,000 gallons in September, according to the monthly report of the Bureau of Mines.

The major increases in output occurred in the Panhandle, Illinois, Oklahoma and Appalachian districts. The month's production of 329,028,000 gallons brought the total for the first ten months of the year to 3,053,148,000 gallons against 2,886,786,000 gallons in 1942.

The most important change in the production of light products in October, the bureau reported, was the greater output of liquefied petroleum gases at natural gasoline plants.

Light product production during the month included 180,432,000 gallons of natural gasoline against 176,190,000 gallons in September, 60,396,000 gallons of cycle products against 59,136,000 gallons, 16,338,000 gallons of isobutane at natural gasoline and cycle plants against 15,120,000 gallons, 71,862,000 gallons of other liquefied petroleum gases at natural gasoline and cycle plants against 64,638,000 gallons, 11,004,000 gallons of liquefied refinery gas at refineries against 13,944,000 gallons and 8,400,000 gallons of benzol, unchanged.

Stocks of natural gasoline and allied products declined during the month, those at refineries dropping from 106,764,000 to 101,178,000 gallons and at plants and terminals from 91,602,000 to 86,352,000 gallons..

Texas Hearings

A hearing has been scheduled by the Texas Railroad Commission for January 5 to determine whether the rule regulating the intermediate string of casing in the Seminole field, Gaines County, should be amended.

The statewide proration hearing for January has been scheduled for January 19.

PIPE LINE REVIEW

First Slugs of Finished Products Move Into South End of 20-Inch Line

With all but three of the stations in the 20-inch "Big Inch Junior" products line ready to handle fluid, only final testing of sections of the big tube at maximum operating pressures slows down the actual beginning of deliveries through the artery. At 11 on the morning of December 22 an initial slug of gasoline, 150,000 barrels of it, began to move into the line at Baytown, driving ahead of it swabs to clear out the water with which the line had first been hydraulically tested.

Following the initial batch of gasoline, there will be a steady throughput of No. 2 heating oil, probably to continue well into if not to the end of March. With the line as far as Norris City in operation as soon as maximum pressure tests have been completed, the number of stations ready to pump between that point and the Atlantic Seaboard will probably hold daily pumpings to a range of 120,000 to 150,000 barrels per day until the fuel oil pumping now scheduled is completed.

The 20-inch line, despite the serious delays imposed by almost a month of heavy rainfall shortly after laying was begun, was completed except for the stations and final testing in a period of 225 working days; this record bettering considerably the anticipated completion date and being made over the additional handicap of weeks during which no pipe was being delivered due to change-over at the steel mills to handle other war needs.

Before the line throughput is stepped up, when and if sufficient finished products are made available to it, each link in the 1600-mile carrier will have been operated over a sufficient test period at maximum pressures to insure against any contingencies when such runs become the order of the day.

Shell Building Short Lines in West Texas

Shell Pipe Line Corporation has authorized construction of a 4-mile, 6-inch welded oil line from the Wheeler-Ellenburger pool, Winkler County, West Texas, to tie into Magnolia Pipe Line Company's Wink-Midland 10-inch trunk line. The pool's single deep producer is dependent upon tank trucks for an outlet for the 220 barrels allowable daily, and four tests are under way. The company also proposes to replace the temporary 2- and 3-inch line that serves the Monahans deep area, Ward County, by laying 3 miles of 6-inch to a station near Monahans on its New Mexico-McCamey system.

Gas Measurement Course To Be Held in June

Southwestern Gas Measurement Short Course, held annually until last year at the University of Oklahoma, Norman, will be held again this year on June 6, 7 and 8. A major consideration in holding the course this spring is to provide new personnel with a gas-measurement background sufficient to meet the expanded requirements of industrial and domestic demands. Many of the measurement men now responsible for keeping industry supplied have been obtained from other branches of industry, and the course will particularly appeal to them while new and advanced techniques in handling gas will have an appeal to the more experienced.

Carter Will Drop Names Of Purchased Companies

Santa Rita Oil & Gas Company and Northwest Refining Company, recently acquired subsidiaries of The Carter Oil Company in the Rocky Mountain area, are being absorbed and the names of the firms will be dropped on January 1. R. E. Damp, who transferred from the Illinois area to Billings, Montana, is supervisor of the operations.

Davies and Pyron to Speak Before California Meeting

Ralph K. Davies, Deputy Petroleum Administrator, will speak at the annual meeting of the San Joaquin Valey Oil Producers Association in Bakersfield on December 28.

Representative Clarence F. Lea of California will speak on "Petroleum Problems before Congress;" and General Walter B. Pyron will present a paper on "War Demands for Petroleum." The afternoon program will open with a symposium on secondary recovery of oil, led by A. C. Rubel of Union Oil Company.

Navy Needs Officers for Oil-Terminal Supervisors

The Navy needs men who can qualify as officers in connection with a special program for oil-terminal supervisors, and has sent out a call for volunteers for such service.

Successful candidates will be commissioned and assigned duties, both within and beyond the continental limits of the United States, having to do with the handling of all types of fuel, including the loading and unloading of tankers, tank cars and barges and the supervision of storage facilities.

Applicants must have had at least five years' experience in the handling of bulk fuel oil and at least two years' experience in a water terminal storage plant in a supervisory capacity. Inland terminal experience unless accompanied by experience at a water terminal is not acceptable. Candidates must have a knowledge of the loading and unloading of ocean-going tankers of large capacity. At least two years of college education is desirable but outstanding business progress and experience will be given consideration in lieu thereof. It is also desirable for candidates to have a know-

ledge of specifications for gasoline, fuel oil, lubricants and aircraft-engine oil.

Age limit is from 30 to 50 years.

Applicants must meet Naval physical requirements and possess officer-like qualities. All applications should be made to Procurement Offices located in principal cities throughout the United States.

Gulf Extends Period of Aid To Employees in Service

Extension from January 1, 1944, to July 1, 1944, of Gulf Oil Corporation's plan for giving financial assistance to its employees in military service, and to those who will enter the service and their dependents, has been voted by the board of directors. Prior to July 1, 1944, the directors will give consideration to a further extension.

The Gulf plan not only supplements the employee's military pay but aids him in obtaining and carrying government life insurance. The employee's seniority status with the company and his right to re-employment are preserved, as a leave of absence is granted for the duration of the war plus about seven months, if necessary, for demobilization.

Under the plan, the company supplements the employee's military pay during the first three months of his military service and thereafter gives assistance to certain dependents of the employee by making monthly payments to them.

Records of the company show that 88 employees entered the military services during 1940. In 1941, the number who entered totaled 666. The high point was reached in 1942 when 2978 employees went into service. In 1943, through October, a total of 1361 had entered, making a grand total of 5093. September, 1942, was the largest month with 431 employees joining.

This year the company will pay approximately $1,221,000 to employees in the armed services and their dependents. The total since Pearl Harbor is in excess of $2,000,000.

Publication Summarizes Illinois Wildcat Drilling

Wildcat drilling activities and results in Illinois, covering the period from 1936 to June, 1943, are summarized and discussed in detail in a report, No. 47, by Charles W. Carter, Illinois State Geological Survey, Urbana, Illinois.

Data is presented in tabulated form by years regarding number of wildcats drilled, pools discovered, number of wildcats per discovery, formations tested, development of pools following discovery, and producing acreages involved.

A special table on 1943 wells provides data on individual wells, giving location, depths, deepest formation tested, well ownership and name, initial production, and evaluation of cores.

The author offers recommendations for increasing oil production in Illinois, dealing with the study of small pools, deeper production possibilities, and the application of secondary-recovery methods. The possibilities of finding new pays in existing pools and the potentialities of Illinois counties lying beyond the Illinois Basin area are likewise discussed.

International Developments

Prince Edward Island Well Making Progress

More than 2800 feet of hole has been made in Island Development Company's wildcat, eight miles offshore from Prince Edward Island, farthest east province of Canada. Drilling operations are carried on from a crib, filled with rock, located on the crest of the anticline which shows up plainly on the island's shore cliffs. The structure was seismographed by Cities Service Oil Company in 1940 and 1941, following which survey that company joined with Socony-Vacuum Oil Company in underwriting the drilling plans of Island Development Company, headed by Hugh MacKay, Oklahoma geologist and native of Nova Scotia. Estimated cost of the proposed deep test, which may go beyond 15,000 feet, is $500,000, according to MacKay.

A previous test of the structure, on an island 1½ miles closer to shore, was made in 1927 by Cities Service Oil Company. The hole was abandoned at 5970 feet because of inability to complete with equipment then used. This previous test location is now known to be well down structure.

New Fields of Southern Alberta Plains Important

Recent encouraging oil discoveries on the Great Plains of Southern Alberta are opening up a new chapter in the story of Canadian oil development. It is believed 1944 will mark a definite step forward in the opening of new fields and the expansion of present fields on the plains. This past season has seen seismographed field work on a scale never before known in Alberta; and while Turner Valley continues to lead the procession in a dominating way, it is not by any means the only Alberta field of importance. Turner Valley, in fact, in the opinion of some, may have reached its peak. The plains, on the contrary are just coming into their own.

The Taber oil field still holds the spotlight following the recent completion there of Dominion Oil Company's Taber-Province 17-18b as the biggest Canadian well outside Turner Valley. It swabbed at the rate of 500 barrels a day. The well, a direct north offset of Taber-Province 1, had 37 feet of oil saturation in the Taber sands at 3141 feet, the oil testing 21 gravity.

Taber-Province 1, the best previous Alberta well outside the Valley, produced 406 barrels in its best 24-hour run. Storage at the well is filled, and the well is now shut-in.

The Taber field lies 34 miles east of Lethbridge on the Crow's Nest line of the Canadian Pacific Railway, and it presents no serious drilling problems. Now that the field has been explored, wells can be put down cheaply, and it is probable the new refinery at Lethbridge will be able to handle the oil provided tank cars or tank trucks can be procured.

Meanwhile, in the Del Bonita field adjacent to the Montana border north of Cut Bank, Pacific Oil Co.'s No. 1 well has 4700 feet of 37-gravity oil in the hole, and an upper oil zone has not yet been tested. The company rates the well a commercial one as it stands. It flows in heads, and there is no water intrusion. The new producer is a direct west offset to the Del Bonita discovery well, which has been making around 20 barrels of oil a day for years.

Pincher Creek field is yet another south Alberta area in the Canadian oil spotlight. There Arrow-Marjon No. 1, being drilled for the company by Petroleum Corporation of Canada Exploration, Ltd., has been spudded and is drilling. Pincher Creek was the scene of some of the earliest drilling in Alberta and although good shows have been obtained commercial production has been lacking.

Air Pilots Report Fire At Camp Canol

Commercial airline pilots, flying the route between Edmonton, Alberta, and Mackenzie River outposts, reported that a large fire had broken out at Camp Canol, 50 miles north of Fort Norman, destroying a section of the construction headquarters village, occupied by several hundred civilian employees of United States engineer division and contracting companies engaged in laying the 1500-mile pipe line between Norman Wells and Whitehorse.

New Del Bonita Well Makes Good Flow

Anglo-Canadian Oil Company was completing Del Bonita 1 in the Del Bonita field, Alberta, on December 16, as a dual completion job. The well was flowing by heads, with a clean 37-gravity oil yield that is expected to show 400 barrels daily after both pays are acidized. It is bottomed at 4700 feet.

Three New Tankers Serve British Columbia Ports

Three new 10,000-ton tanker vessels were put into service in December to help alleviate the delivery shortage to British Columbia ports. In addition, 2 recently completed freighters have been assigned to Pacific Coast service north of Puget Sound. Plans call for further expansion of West Coast shipping service in all needed categories, and several more tankers will be added to the wartime fleet in coming months, to carry petroleum products to Canadian and Alaskan terminals.

Alberta Producers Ask Changes in Conservation

Alberta Petroleum Association members at a recent meeting in Calgary decided to petition the Alberta Petroleum and Natural Gas Conservation Board to order adoption of the newly-formulated Weymouth plan, to replace the Brown plan, now being applied for gas utilization in the Turner Valley field. Under present regulations well allowables are figured according to actual use of gas in field operations or by gas company installations. The proposed Weymouth plan would allow 95 percent of Turner Valley gas to be returned to pay sands or stored in other formations. Thus, well allowables could be boosted without increasing waste of gas in the field.

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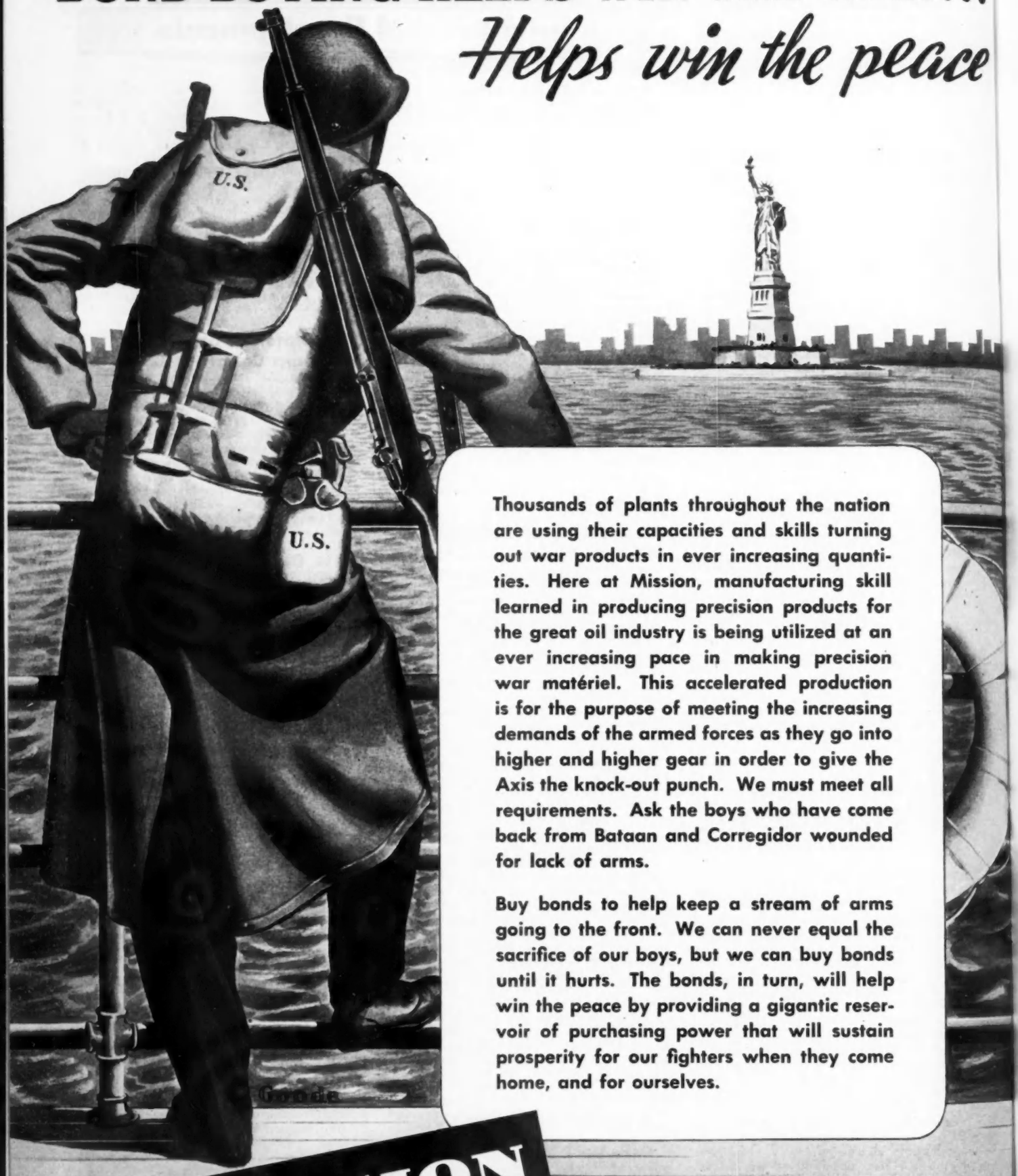

Thousands of plants throughout the nation are using their capacities and skills turning out war products in ever increasing quantities. Here at Mission, manufacturing skill learned in producing precision products for the great oil industry is being utilized at an ever increasing pace in making precision war matériel. This accelerated production is for the purpose of meeting the increasing demands of the armed forces as they go into higher and higher gear in order to give the Axis the knock-out punch. We must meet all requirements. Ask the boys who have come back from Bataan and Corregidor wounded for lack of arms.

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U. S. Field Operations

Kansas

Rooks County Pool Opener Shut In for Storage

Continental Oil Company has a pool opener temporarily shut down for tankage in Rooks County with pay in the Arbuckle lime and the hole at a total depth of 3843 feet. The test, Breggeman 1, NEC 5-10s-20w, filled 2600 feet with oil and no water and on a swabbing test showed for 50 barrels in the first hour. This well started as a stratigraphic test, and was later converted to a normal hole.

In the same county, another well is showing for saturation in the Arbuckle lime. This is Champlin Refining Company's Marcotte 1, SE NE SW 15-10-20w, which found the lime at 3753 feet and drilled on to 3764. The hole partly filled with oil, and some salt water was showing as the operator discontinued drilling to run 5½-inch to the bottom. Plans are to perforate opposite the saturated section of the lime and complete through the casing.

Cowley County: The Bartlesville sand discovery indicated last week has shown a potential of 78 barrels daily, failing to come up to first indications of better production. The well is Gralapp et al's Heskett 1, SE SW SW 19-33-3e, near Rahn production. The sand was drilled from 2990 to 3222 feet.

Finney County: West Kansas has an interesting near completion at Atlantic Refining Company's Gobleman 1, SE NW NW 35-21-34w, which found the Misener sand at a location near the established Mississippi lime production in the Nunn field. While the Misener failed to make commercial production, it did show saturation, and can be listed as an additional prospective horizon in this area. The well was plugged back to the Cherokee (Pennsylvania) sands for further testing.

Oklahoma

Promising Wildcat Tests Are Reaching Critical Depths

The state's two most closely followed wildcats, both being drilled by Carter Oil Company, are drilling ahead at depths approaching the critical stage. The first of the two, Cottingham 1, CSE SW 4-7n-3w, in McClain County, drilled into the Simpson lime at 10,295 feet and was still in this formation at 10,318 feet. Earlier, the well found the top of the Viola lime at 10,227.

Carter's Johnson Ranch 1, CSW NE 13-8n-4w, in the same county, was still drilling in the Pennsylvanian sands and shales at 9,124 feet with the more important formations yet to be reached. Slight shows had previously been encountered in this well. Both wells are located upon deep anticlines surveyed in detail by seismograph, and both structures are geologically related to the area in which Mid-continent Petroleum Corporation Harris 1 opened a new Wilcox sand field two months ago.

Pottawatomie County: Stanolind Oil and Gas Company's Rosebush 1, sw sw sw 19-8n-2e, which opened a new Wilcox sand field in the Macomb area, is a near completion after flowing 140 barrels in 24 hours through a ¼-inch choke. Top of the pay was at 6241 feet, drilled to 6251.

Oklahoma County: The West Edmond field has been given a two-location extension to the east at D. Bourland's French 1, CNW NW 33-14-4w, which topped the Hunton lime, chief pay of the field, at 6770 feet and drilled good saturation to 6853 feet. No test has yet been made.

Canadian County: A deep structure is to be tested by General Oil Company at their Rice-Finch 1, SW NW SE 14-13-7w, another location in the Western Oklahoma area which many have favored highly as the State's most promising, undeveloped area. The well is located on a block made up for some years covering a surface feature that more recently has been examined geophysically. The Wilcox sand is anticipated at 9,000 feet or less although there is little control available in the vicinity of the test to definitely fix the probable depth.

Noble County: Gulf Oil Corporation's Juanita 1, NEC 1-21-1e, a new pool discovery previously detailed, has run tubing and is awaiting connections prior to a completion test.

Illinois

White County Wildcat Showing for Production

Burr Lambert and C. E. Brehm's Boultinghouse 1, SW NW NW 19-4s-14w, is showing for a discovery in White County. The well is waiting on cement after setting casing to 3097 feet for a test of McClosky lime which yielded 2500 feet of oil in nine minutes during a drill-stem test at 3097-3106 feet.

Clinton County: C. H. Nickerson and others are drilling below surface pipe at an interesting wildcat in Clinton County. The well is Goffray 1, NE NE SE 2-1n-3w.

Sangamon County: Approximately 25 miles southeast of Springfield, O. A. Reed's wildcat, Ross 1, SE SE SW 21-15n-3w, is creating considerable interest among oil operators. Trenton lime was topped at 2217 feet and a light odor of oil was found without a show of water. Drill is moving ahead below 2274 feet. The well is many miles removed from any production.

Edwards County: Lambert and Parris have set casing to test a show of oil in Cypress sand at Cowling 1, SW NW NE 29-2s-14w, a southeast outpost test of the Albion pool. The oil show was encountered at 2815 feet.

Superior Oil Company's Carter 1, NW SW NE 32-1s-14w, is drilling below 500 feet.

Jefferson County: A new horizon for the Markham City North pool has been discovered at Central Pipe Line Company's Henry 1, NE SE 13-2s-4e. On a drill-stem test of Aux Vases sand at 2938-45 feet, the well flowed oil in 45 minutes. Other production in the pool is from McClosky lime. Henry 1 also had a show in the McClosky.

Fayette County: The Texas Company has shut down for orders at Stokes 1, SW NW NW 7-8n-1e, a wildcat in Ramsey township, at 2915 feet. The well probably will be taken to the Trenton lime.

Leland Waggoner has set surface casing at Koelling 1, NE NE NW 28-5n-4e, a wildcat.

Hamilton County: Phillips Petroleum Company is still waiting on cement at Federal Coke Company 1, SE SE NW 8-7s-6e, after finding pay in Aux Vases sand at 3137-52 feet.

Shell Oil Company's Rebstock 1, SW SE NW 26-4s-7e, in the Bungay area, flowed 400 barrels of oil in 24 hours after a shot in Aux Vases sand at 3281-97 feet. In the same area, National Associated Petroleum Company's Peters 1, SW NW SW 26-4s-7e, has been abandoned at 3058 feet.

Indiana

Small Well Opens Pool in Spencer County

A small producing well was completed in Spencer County this week to give Indiana a new pool. L. L. Benoist's C. A. Richards 1, SE NE SE 11-7s-7w, on initial pump test produced 4 barrels of oil in 24 hours from McClosky lime at 1540-46 feet, total depth 1548 feet. The well was named discovery of the Richland City pool.

Operations in the state this week totaled 70, a slight increase from last week when 68 operations were recorded. They included 41 drilling, 14 locations, 8 rigging tools and 7 inactive tests. First reports totaled 9, of which 2 were wildcats.

Thirty-one wildcat tests were listed, including 17 drilling, 6 locations, 4 rigging tools and 4 inactive.

Oil wells completed totaled 4 and they had total initial production of 227 barrels daily. Two wells were dry.

Kentucky

Year-End Slump Reduces Field Work

The annual end-of-the-year slump cut activity in Kentucky this week, dropping operations from 88 to 80.

Only 4 first reports were recorded and these included no wildcats. Operations included 64 wells drilling, 9 locations, 2 wells rigging tools and 5 inactive tests.

Wildcat work also dropped, moving down from 33 to 28, of which 23 wells were drilling, 1 was a location, 1 was rigging tools and 3 were inactive.

Three oil wells were completed with total initial production of 336 barrels daily. Eight holes were dry and 1 location was abandoned.

C. P. PARSONS, vice president of Halliburton Oil Well Cementing Company, Duncan, Oklahoma, has been made assistant director to Frank A. Watts, director of materials, PAW, Washington, and will assume his new post as of the first of the year.

Crude Oil Output Again Sets Record in October

Topping all previous records for the third consecutive month, crude oil production in October totaled 136,503,000 barrels, the daily average of 4,403,000 barrels exceeding that of September by 56,000 barrels and October, 1942, by 515,000 barrels, it was reported December 23 by the Bureau of Mines.

On the basis of output for the 10 months ended with October, 1,234,378,000 barrels this year against 1,149,781,000 barrels in 1942, total domestic production for 1943 will top last year by at least 100,000,000 barrels, it is indicated.

While production continued to increase, demand dropped 64,000 barrels a day from the September level to 4,324,000 barrels in October, and domestic crude stocks increased 80,000 barrels daily, total stock of foreign and domestic crude increasing during the month from 245,192,000 to 248,167,000 barrels.

Crude runs to stills failed to maintain the September record level of 4,203,000 barrels, dropping to 4,162,000 barrels, it was stated. The gasoline yield rose from 38.1 to 38.6 percent and that of distillate fuel oil from 17.7 to 15.9 percent, but the yield of residual fuel oil dropped from 29 to 26.9 percent. Total demand for gasoline was about 8 percent greater than in October, 1942, and stocks of finished gasoline declined about 86,000 barrels during the month to 59,100,000 barrels, which was 8,600,000 barrels under inventories on October 31, 1942.

The Bureau of Labor Statistics placed the index for petroleum and products at 63.5 for October, against 63.2 for September and 60.6 for October, 1942. The operating ratio was 90 percent, compared with 91 percent in September and 82 percent in October a year ago.

November Gasoline Tax Higher Than Last Year

Revenue from the federal gasoline tax in November exceeded the corresponding month of the previous year for the first time since rationing was instituted, the Internal Revenue Bureau disclosed December 23.

November collections on gasoline were $23,575,563 compared with $20,719,050 for the same month last year, the bureau reported. The month showed a gain of nearly $700,000 over the $22,863,919 collected in October.

Collections of lubricating-oil tax, while off from the unusually high figure of $5,645,908 recorded in October, also were well above November, 1942, the figures being $3,292,418 against $2,838,152, but receipts from pipe-line transportation, $976,550, were low compared with the $1,342,187 reported for October and the $1,219,101 of November, 1942.

In the 11 months ended with November, rationing cost the treasury $167,000,000 as compared with gasoline-tax collections in 1942, receipts for the period being $240,728,247 against $308,231,570. Collections from both lubricating-oil and pipe-line transportation, however, showed an increase over last year, the former totaling $45,513,462 against $37,648,466 and the latter $12,702,360 against $12,583,049.

Senate Revises Gas Provisions in Tax Bill

Provisions of the House approved tax bill liberalizing the excess-profits tax treatment given excess output of natural gas companies, applicable to the net income derived from the withdrawal, storage and transportation of natural gas by pipe line, have been revised by the Senate Finance Committee to limit the relief only to net income derived from withdrawals from the natural-gas property in which the company owns an economic interest. The relief will be granted with respect to all taxable years beginning after December 31, 1942.

The relief provision was written into the bill after representatives of the industry told the House Ways and Means Committee that the heavy demands of the war were rapidly depleting natural gas reserves and the companies would have greatly depreciated properties on their hands after the war, suffering heavy losses if required to pay excess-profits taxes on present swollen business.

Magnolia Using Part of New West Texas Line

Magnolia Pipe Line Company had reached the halfway mark in welding its 337-mile, 12-inch, supplemental line from Midland to Corsicana when contractors' crews halted work for Christmas. The company is utilizing the completed portion of the line as temporary loops to its parallel 8-inch system in order to progressively step up its oil movement from the Permian Basin, having put into service the 24-mile sector extending from Merten to the Corsicana Junction on its Mid-Continent-Beaumont system.

Deep Borehole Surveys and Problems

By M. H. HADDOCK

Principal, The Mining and Technical Institute, Leicester, England

This book gathers into one convenient volume and explains all of the important and accepted means of surveying the courses of deep boreholes and orientating their cores. It traces the evolution of modern borehole-surveying devices, and adds various problems relevant to strata, location and orientation.

The author has supplemented his own experiences and observations with information from workers in America, Germany, Russia and elsewhere, and makes frequent reference to these sources in illustrating the use of the various methods of equipment.

CHAPTER HEADINGS

1. Deviation and Its Causes
2. Auxiliary Registrations in Borehole Surveys
3. Instrumental Survey of Boreholes
4. Fluid Methods of Surveying Boreholes
5. Core Orientation
6. Compass and Plumb-Bob Methods
7. Pendulum Methods
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North Texas

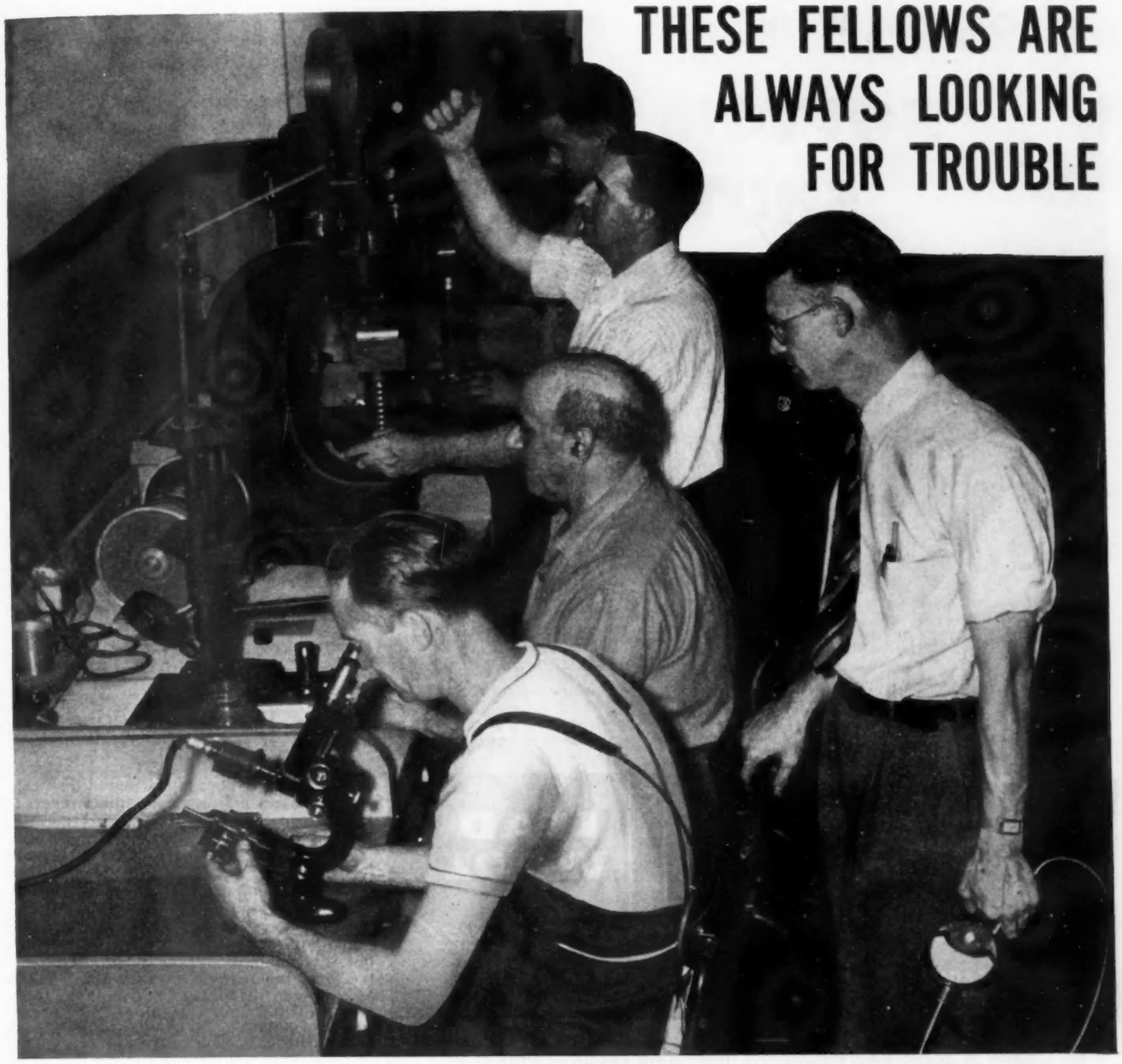
South Walnut Bend Pool Has New Strawn Pay

A new oil pay for the Strawn series in the South Walnut Bend pool, Cooke County, was confirmed when Seitz-Comegys, Seitz et al's Blankenship 1, Block 46, Fannin County School Lands, pumped 20 barrels of pipe-line oil on 8-hour test. Production is from perforations in saturated sand at 4478-83 feet, and the well was plugged back from water in Winger sand at 5556-5614 feet. The partnership's discovery was completed in sand at 4289-4316 feet, which proved dry for their second test. More development is slated for the area.

Wichita County: Consolidated Oil Company's Michna 1, south offset to its discovery Strawn well in the Airport pool, pumped 30 barrels of oil and 100 barrels of water initial after acidizing through perforations at 4405-25 feet. This is the second producer for the area. In the nearby Davidson pool, the company's Williams 2, north offset to its Ellenburger discovery, registered potential of 776 barrels through ¾-inch choke from Ellenburger perforations at 5307-51 feet.

Montague County: Continental Oil Company's Heard 1-A, 1½ miles north of the Mueller pool, was drilling shale at 6316 feet and above the Bend section, indicating low structural position. Gulf

THESE FELLOWS ARE ALWAYS LOOKING FOR TROUBLE



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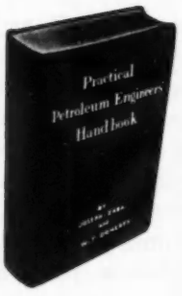
This handbook was compiled and published for the purpose of saving the time of operators, engineers, superintendents, foremen and others.



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Oil Corporation's Haggard 1, 5 miles west of Bowie, abandoned after testing water in Ellenburger at 7255 feet.

Grayson County: Pure Oil Company has contracted for the drilling of J. Smith 1, J. J. Morris Survey, to 7000 feet, or water in Ellenburger. Location is two miles south of Gordonville, and on a seismograph prospect.

Shallow Prospects: Bridwell Oil Company's Campbell 4, O. F. Leverett survey, Cooke County, set pipe to try for completion in broken oil sand at 744-48 feet and saturated sand at 757-66 feet. The company drilled five failures in the area in recent months.

In Archer County, Valley-Osage Oil Company's Turbeville 1, Block 27, Jefferson County School Lands, was making production test of oil sand at 1105-1110 feet with pipe set at 1103 feet.

Archer County: J. A. McCarty and Coleman's Taylor 3-A, lot 2, ATNCL 13, was awaiting pumping unit with source of oil production undetermined. This fourth deep test for the two-pay area showed a small amount of water when originally tested in Ellenburger with open hole at 4982-99 feet. The hole was plugged back to perforate opposite Mississippian saturation at 4924-44 feet, then swabbed dry. When deepened to 5006 feet the well filled 2400 feet with oil and 100 feet with water in 16 hours to indicate a pumper.

Southwest Texas

Large Structure Topped in Brooks County Wildcat

Indications of the presence of a large structure and possibly a major oil field, or at least a major gas-distillate reserve, is seen in Standard of Texas' strike 3½ miles east of Alta Mesa field in Brooks County. This particular area has been exceptionally active within the past few weeks. Attention was intensified in the area when Humble Oil & Refining Company logged 3 oil sands and 4 gas-distillate sands in a wildcat 6 miles north of the Standard of Texas wildcat.

The Standard well is Chavana 1 in La Encantada grant. The company took over a dry hole abandoned in April, 1941, at 6658 feet. After the dry hole was drilled interest lagged and Standard bought all available leases. The company recently drilled the well deeper and set 7-inch casing to 7064 feet. Perforations were made at 7040-50 feet and the discovery was 9 stands of gas cut mud and 5 stands of salt water and 3 stands of mud. Operators squeezed these perforations and drilled to 7288 feet where the well blew out.

After the blow out was controlled the hole was drilled to 7307 feet. Cores which showed gas-distillate were taken at 7307-23 feet. The well was then drilled to 7364 feet, total depth. Operators set 367 feet of 5½-inch liner, bottomed at 7361 feet. Perforations were made at 7292-99 feet and 7281-87½ feet and squeezed to shut off high pressure gas sands. Perforations were again made at 7113-21 feet, with 48 shots, for the production test after topping the sand at 7109 feet. A high pressure gas broke into the hole, which made it necessary that the well be killed. Operators now are attempting to make a new flow test in the same sand.

Later, it was ascertained that the well blew out from the 7288-foot level. After the fire was extinguished, the well flowed

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Many a soldier owes his life to a commander who drove him to the utmost in battle—*never let him slacken for a single fatal instant!* And after the war, many a worker will owe his economic safety to a leader who drove him continuously for higher Pay-Roll allotments for the purchase of War Bonds!

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considerable 38 gravity oil between the drill pipe and casing. The blowout was in the Vicksburg sand, the Warreni being topped at 6810 feet.

Operators have staked location for a second test, B. Garcia 4, lease 1, 4000 feet west of the blowout well and toward the Alta Mesa field. It will be a 9500-foot test. The sand conditions and the high pressures indicate a large productive area, geologists believe, with the result that considerable interest is centered on the discovery. Standard of Texas has several thousand acres in the area.

Discovery: Humble Oil and Refining Company has made a flow test on its major discovery 4 miles northeast of Alta Mesa field, Brooks County. The Scott & Hopper 1 flowed at the rate of 178 barrels of 41.3 gravity oil daily through ¼-inch choke through the tubing. Perforations were reported to have been made in the 6866-foot sand section, the deepest sand carrying oil. A gas sand also was perforated and tested, showing 2200 pounds pressure on the casing.

This discovery, which is believed to be Humble's largest of the year, is located in ACH&B survey 107. Geologists and operators believe the field will embrace several thousand acres in view of the many sands logged. Oil pays were logged and tested at 6321-43 feet, 6534-52 feet and 6866-94 feet. Gas-distillate pays were logged at 6508-24 feet, 6584-6605 feet, 6783-6810 feet and 6846-66 feet, all in the Frio-Vicksburg section.

The company's second location in the field, designated Scott & Hopper is Scott & Hopper 2 and is spotted 1320 feet south of the discovery in ACH&B survey 107.

Karnes County: Arkansas Fuel Oil Company's Lyons 1, Reklaw sand discovery 2 miles south of Runge in the east part of county, flowed 137 barrels of 49 gravity oil daily from perforations at 6595-6610 feet, 125 pounds pressure on tubing, casing sealed. This discovery is in D. C. Lyons survey and is 7 miles northeast of Hondo Creek discovery.

Deal: Development is due to be started in 1944 on the Pescadito structure in Webb County, 15 miles north east of Laredo with O. W. Killam, Laredo operator, closing a trade with Seaboard Oil Company involving approximately 38,000 acres. The leases are on the Luis R. Ortiz and Ignacio Benavides ranches. The Pescadito structure is one of the largest of its kind in Southwest Texas.

Texas Gulf Coast

Sun Opens Gas-Distillate Field in Harris County

Sun Oil Company is making the first flow test in a wildcat well 4 miles northwest of Huffman in Harris County, the well indicating the opening of a gas-distillate field. The well is Hirsch 1 in James H. Isbell survey. The company perforated 5½-inch casing at 8480-90 feet after drilling to 8821 feet and setting casing on the bottom. Operators have been washing the well into production, showing gas-distillate. The sand was logged in the lower Yegua section, although complete details have not been released.

Also in Harris County, on the west

side of the Humble dome, Sun Oil Company is preparing to drill a semi-wildcat well, Bender 1. The location is in J. B. Jones One-Third league and W. B. Adams One-Third league. Drilling will start soon. Additional drilling is reported planned around the edges of the dome, especially after Texas Company opened two deeper sands on the east side.

In north Harris County in the Spring Creek area Shell Oil Company has spudded Holderrigh Unit 1. It will be a 12,250-foot Wilcox test, and one of the deepest ever drilled in the area if the objective is reached. It is in George Galbraith survey, 2800 feet northwest of Henry DeArman's McDonald 1, 6115-foot dry hole.

Chambers County: Wynn Crosby Drilling Company and Kirby Petroleum Company have tested Mayes 1, a semi-wildcat in Robert Oliver survey and 1 mile southwest of the operators' Jackson Pasture discovery. The well, which proves the presence of a large gas-distillate reserve, was perforated at 8082-88 feet and has been cleaning. The pressure built up to 2500 pounds when it was shut in. The well probably will be opened later when storage is erected and an outlet is found for the gas. Total depth is 8434 feet with 5½-inch casing set to 8125 feet.

Blowout: Phillips Petroleum Company has been fighting to control a blowout well in the League City field of Galveston County. Operators were attempting to dually complete the Lobit 1, discovery well drilled in 1938, when one of the sands blew out and sprayed approximately 25,000 barrels of oil daily over the lease and field. The well was originally completed in perforations at 9092-9105 feet.

South Louisiana

New Gas Field; Possible Oil Reserve Brought in

A new gas field and possibly a new oil reserve, is indicated in the northwest part of White Lake in Vermilion Parish where the Union Oil Company (California) is making first flow tests in State-White Lake 1-A, lease 540. Operators are reported to have logged a fairly thick gas sand in the Miocene and set 5½-inch casing to make the test. Total depth is 12,000 feet with the casing cemented around 10,760 feet. This discovery is eight miles northwest of the company's East White Lake field.

Discovery: Amerada Petroleum Corporation has made an official completion test in Bertinot-Quebedeaux 1, wildcat discovery of the Arnaudville field in St. Martin Parish. Location is in Section 44-7s-5e near Arnaudville townsite. The well was perforated at 10,349-78 feet, 87 shots, and the flow was 65 barrels daily through a 5/32-inch choke, tubing pressure mounting to 3700 pounds, gravity 42.5. Total depth is 10,700 feet with 5½-inch casing cemented at 10,445 feet.

Shell Oil Company has completed another slight outpost at Northeast Gibson in Terrebonne Parish. The company's Realty Operators 16-B, Section 17-17s-15e, was perforated at 9199-9208 feet, 36 shots, and flowed 300 barrels daily through a 9/64-inch choke. Total depth is 9540 feet with 5½-inch casing set to 9539 feet. Operators also set a 10-gauge screen at 9186-9213 feet.

Acadia Parish: Sun Oil Company is preparing to make a flow test in Trimble 1, the second test in the Egan field, northeast of the discovery. A liner has been set around a total depth of 10,550 feet in a sidetracked hole. Operators first drilled the well to 10,643 feet where it attempted to blow out but finally was controlled. The hole was plugged back and sidetracked due to mechanical trouble near the bottom in the original hole. Location is in Section 31-9s-1w.

Beauregard Parish: Sohio Oil Company has been coring in the discovery sand in Lutcher-Moore 2, second well in the recently discovered Fields area. The well, Section 4-7s-12w, has been finding the pay sand about flat with the discovery. The discovery producer, Lutcher-Moore 1, was completed in September, 1943, for 182 barrels of condensate daily in perforations at 8014-20 feet in the Cockfield sand.

Arkansas

Seven Oil Producers Added During Week

Seven producers were added in Arkansas fields during the past week but these were offset by abandonment of two wildcat operations. No new wildcats were announced in the state during the period.

Lafayette County: One new producer was added in the Midway pool with completion by Barnsdall Oil Company of W. E. Hodnett 1, 7-15-23, good for 292 barrels daily through a small choke.

Columbia County: One new dual completion was recorded in the Macedonia field with completion of The Atalntic Refining Company's Smith Unit 1, 17-18-21, with production of 54 barrels from the lime and 192 barrels from the Cotton Valley section.

In the Stephens-Smart field, G. H. Vaughn's Green 5, 11-15-20, was completed for 52 barrels, Rowe 2, 12-15-20, 159 barrels, and Rhonehart 5, 11-15-20, making 199 barrels daily.

Union County: Expected play to the southeast of the Urbana field fizzled out this week with abandonment by Phillips Petroleum Company of Andrews-Gilliam 1, 27-18-13, at 5037 feet.

Ouachita County: Jack Carne's Bragg 5, 25-13-18, abandoned at 1450 feet.

Michigan

North Adams Extension Flows 150 Barrels Hour

C. W. Teater's Collins 3, NE SE SE 15-19n-3e, North Adams pool, Arenac County, flowed 150 barrels per hour natural from Dundee at 2875 feet to indicate probable extension of pool farther north. The pool was developed in 1940, has only 20 wells, all on 10-acre units, but it has produced around 17,000 barrels per acre compared to 4500 and 7000 barrels per acre in average best Michigan pools.

Don Rayburn has cleared eight permits with PAW to develop for 1600-foot Berea sand gas in Adams and Moffatt townships, Arenac County. Rayburn has drilled two wells in the area a mile apart, each showing 500,000 feet of gas in this horizon.

Ingham County: William Colvin, Jr.,

So You Have A Headache!

Two bums found a pack of greasy cards and sat down by their camp fire for a few hands of poker. Bum No. 1 drew a royal flush and bet a million dollars. Bum No. 2 drew four-of-a-kind, saw the million and raised it a billion. Bum No. 1 threw down his hand in disgust. "Hell," he said, "I can't play poker with an educated so-and-so like you!" Any of our bureaucrats could go to town in a make-believe game like that. They live in a make-believe world and specialize in astronomical figures. Unfortunately the figures are not make-believe. Many a headache today is not so much a hang-over from Christmas as a left-over from December 15th. All of which leaves all of us in a mood for work, the specific American antidote for poison in any form. TRY PELCO FIRST. Let's win the war and then clean house.

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has abandoned Glasser 1, SE SE SE 14-3n-1e, wildcat, at 6599 feet. Deepest test drilled in Michigan in two years, the wildcat logged St. Peter sand at 6581 feet and picked up water at 6592 feet. Plans to drill 2000 feet deeper were cancelled after a rotary rig had been moved in to replace cable tools used to the present depth. Efforts to get on bottom with rotary failed and drill pipe was stuck at 6000 feet. It was backed off at 3500 and abandoned.

Rocky Mountain Area

Colorado Well Completing In Muddy and Dakota

Clark's Lake Colorado wildcat to complete in Muddy and Dakota series and Kit Carson Colorado wildcat spuds in.

Clark's Lake: Amerada Petroleum Corporation's Fred H. Hartshorn 1, SE NE SW 15-9n-68w, important Larimer County, Colorado wildcat, found the Sundance at 6485 feet water-bearing and after drilling to 6510 feet is plugging back to the Dakota sands to complete, having set 6⅝-inch casing at 6163 feet. Pipe will be perforated in the Muddy sand which cored 40 feet of saturation at 5897-5947 feet and the Dakota sands at 6112-6163 feet, both of which had oil-saturated cores. The company holds 3660 acres in the (Clark's Lake) area. Location of the test is near the center of the block and on the edge of the lake following a detailed seismograph survey of the district and is 3 miles southeast of the old Wellington field which produces from the Muddy sand at 4200 feet. Continental Oil Company had drilled the deepest test to date in the area when in 1936 it carried a well in 31-10n-68w, Wellington field, to 4992 feet and met disappointment in the Sundance. Amerada's well is four miles southeast of this old test.

O. E. Torrey's J. W. Ruff 1, C SW NE 24-13s-49w, Cheyenne County, Colorado wildcat, is setting surface pipe. This test is being drilled on a 20,000-acre block assembled by Torrey and associates, and Frontier Refining Company is contributing to the well. Keyes Drilling Company is contractor. Location is a mile south of a well drilled in 1938 by Gulf Oil Corporation which had showings of oil in limestone at 4810-4813 feet, but which failed to prove commercial, and two miles south of a well drilled last year by Torrey and associates.

California

Edna and Edison Fields Get Extensions

Pay extensions this week brightened future outlook for the two old shallow Edna and Edison fields. Wildcat statistics otherwise were at a low for the year with only three completions and one new start.

Kern County: In the area to the south of present Edison production, J. Paul Getty's portals 4, 5-30-29, was completed as a flowing well, good for possibly 200 barrels of 17.3-gravity oil. Bottomed at 4079 feet, the well has more than 100 feet of good oil sand.

Six wells in Paloma field at the weekend had reached depths averaging better than 10,000 feet. All are being drilled by Western Gulf Oil Company as operator for Paloma Unit Plan.

Glenn County: Stepping out 15 miles to the northwest from its recent gas discovery, Capital 1, 15-16-1, Colusa County, General Petroleum Corporation is drilling a wildcat, Orland Comm. 8-1, 11-21-3, on an entirely different structure primarily as a gas test.

Los Angeles County: General Petroleum Corporation's Allen 1, 12-3-12, Norwalk area deep test, is bottomed at 10,360 feet in what appears to be Repetto formation, having had no showings of significance, and probably will be abandoned.

Orange County: In order to get access to what are believed to be very rich deposits lying offshore from Seal Beach, Sunset Beach and Surfside Colony, Honolulu Oil Corporation and associates have under way a leasing project involving title to hundreds of separate parcels of private beach properties. Blocking is now nearing completion, and whipstock drilling under the ocean bed probably will get under way early next year.

San Luis Obispo County: Drilled in the midst of Edna field's numerous old shallow wells in production the past 40 years, Los Nietos Company's Scott 1, 5-32-13 picked out a new producing zone at 3155 feet that yielded an initial completion of 144 barrels of 16-gravity oil. The company holds large acreage surrounding the well.

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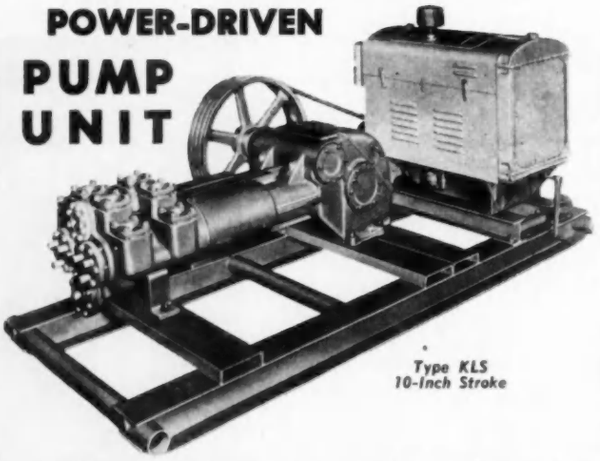

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1. Introduction
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United States Well Completions

ARKANSAS

Columbia County — Macedonia: Atlantic's Smith Unit 1, c s½ ne 17-18-21, dual comp, 54 bbls, lime 9010 ft; 192 bbls, sandstone 6950 ft.

Columbia County—Stephens-Smart: G. H. Vaughn's Green 5, se nw se 11-15-20, 52 bbls, pay 3377 ft.

G. H. Vaughn's Rowe 2, nw nw nw 12-15-20, pay 2520 ft, 159 bbls, td 2540 ft.

G. H. Vaughn's Rinehart 5, sw ne ne 11-15-20, pay 2480 ft, 199 bbls, td 2493 ft.

Lafayette County—Midway: Barnsdall Oil Co.'s W. E. Hodnett 1, c se sw 7-15-23, 292 bbls 36.2-gr, 11/64-in, pay 6410 ft, td 6450.

Ouachita County: Jack Carnes' Bragg 5, c ne se 25-13-18, abnd 1450 ft.

Union County: Phillips' Andrews-Gilliam 1, c se se 27-18-13, abnd 5037 ft.

Union County—Hillsboro: D. V. Lacefield's Union Saw Mill Co. D-2, c sw sw ne 13-18-19, pump 20 bbls, td 2215 ft.

CALIFORNIA

Fresno County—Coalinga: Standard's 77-13D, se nw sw 13-20-14, pump 5 bbls oil, 95 bbls wtr, 313 ft perf 968 ft, td 968 ft.

Standard's 106-13D, sw nw se 13-20-14, pump 43 bbls oil, 18 bbls wtr, 361 ft perf 1421 ft, td 1425 ft.

Kern County—Belridge, South: Belridge Oil Co.'s 86A-29, se ne se 29-28-21, pump 50 bbls 15.1-gr oil 40 sand, 396 ft perf 780 ft, td 780 ft.

General Petroleum Corp's 39-2, ne nw ne 2-29-21, pump 62 bbls oil, 11 bbls wtr, perf 645-725, 923-1020, 1085-1178 ft, td 1200 ft.

Shell's F. K. L. 11, se sw se 1-29-21, pump 78 bbls oil, 12 sand, perf 1174-1098, 1053-950 ft, td 1175 ft.

Kern County—Buena Vista Hills: Standard's 114-35B, nw se se 35-31-23, pump 120 bbls 17.7-gr, 265 ft perf 3315 ft, td 3330 ft.

Kern County—Cymric: Honolulu Oil Corp.'s Fitzgerald 52A-26, sw se se 26-29-21, pump 25 bbls 12.9-gr oil, 10 wtr, pumped off, perf 1188-76, 1110-04, 1097-86, 1058-43 ft, td 1257 ft.

Honolulu Oil Corp's 32, sw ne nw 25-29-21, siltstone, abnd 1891 ft.

Kern County—Edison: Wood Callahan Oil Co.'s Bloemer 1, ne nw se 21-30-21, pump 77 bbls, 55 ft perf 3873 ft, td 3873 ft.

Kern County—Midway-Sunset: North American Oil Consolidated's 74, ne nw ne 16-32-23, pump 44 bbls 16-gr, 5 wtr, 180 ft perf 1798 ft, td 1871 ft, pb 1798 ft.

Kern County—Poso Creek-Premier: Standard's 4-2-21, sw ne nw 21-28-27, pump 8 bbls 12-gr, 5 wtr, 35 ft perf 2875 ft, td 2884 ft.

Kern County—Tejon: Richfield's Tejon 6, sw nw se 35-11-19, pump 73 bbls 18.6 gr oil, 10 wtr, 148 ft perf 2235 ft, top oil sand 2100 ft, td 2650 ft, pb 2246 ft.

Los Angeles County—Coyote, West: Standard's Emery 73, se ne se 13-3-10, pump 198 bbls 29-gr, 406 ft 5½-in, perf 5819 ft, td 5915 ft, pb 5820 ft.

Los Angeles County—El Segundo: Standard's Gough 15, ne ne sw 7-3-14, flow 6,000,000 gas, 23 ft perf 4328 ft, td 4329 ft.

Los Angeles County—Montebello: Standard's Baldwin 111, se se nw 2-2-12, pump 91 bbls 19.2-gr oil, 32 wtr, 2780 ft.

Los Angeles County—Oak Canyon: Western Gulf's L. W. Gilmour Fee 1, sw ne sw 32-5-1, flow 158 bbls 24.2-gr oil, 15 wtr, Lechler zone 7125 ft, td 7495 ft.

Los Angeles County—Wilmington: Brain-Cooper & Associates' 909 Comm. 2, 125 ft s 250 ft e c/l Lomita & Van Tress, perf 3268-3740, 3555-3657 ft, td 3657 ft.

Cecile B. De Mille Production Co.'s De Mille-United 1150 ft n 150 ft e c/l Lomita & Wilmington Blvd, 30-4-13, pump 87 bbls 15.2-gr, perf 3300-40, 3350-90 ft, td 3390 ft.

Union Pacific's 234, 3544 ft s 1755 ft w c/l Ford & Anaheim, 4-5-13, pump 158 bbls 15.2-gr, 138 ft perf 2529 ft, td 2529 ft.

Orange County—Huntington Beach: Huntington State Co.'s State 5, 269 ft nwly 124 ft swly fr c/l 21st & Ocean, flow 680 bbls 20.2-gr, 24/64-in, 210/340 lbs, 799 ft perf 3212 ft, td 3212 ft.

Southwest Exploration Co.'s State J-2, 390 ft w alg proj c/l Ocean fr c/l 23rd St thence 123 ft n at r/a, flow 440 bbls 18.4-gr, 30 wtr, 24/64-in, 260/625 lbs, 1230 ft perf 3530 ft, td 3530 ft.

CALIFORNIA WILDCATS

Kern County—Discovery: J. Paul Getty's Portals 4, se se sw 5-30-29, Edison field extension, flow 152 bbls 17.3-gr, 35/64-in, 115 ft perf 4079 ft, td 4079 ft.

San Joaquin County—Failure: Amerada's Blossom Comm. 1, ne se ne 32-5-5, Thornton area gas test, abnd 3592 ft.

San Luis Obispo County—Discovery: Los Nietos Co.'s Scott 1, nw nw se 5-32-13, pump 144 bbls 16-gr, 20 mud, 65 ft perf 3146 ft. Pismo sand 3102 ft, extension Edna field, td 3155ft.

COLORADO

Rio Blanco County—Rangely: Allen & Doyle's Rector 3, Lot 6 35-1n-102w, abnd Mancos shale 1200 ft.

Newton Oil Co.'s Gentry 4, nw Lot 8 3-1n-102w, pump 4 bbls, Mancos shale 1110-1420 ft, td 1430 ft.

Rio Blanco County—Wilson Creek: Texas-California Co.'s Unit 13, se se nw 34-3n-94w, flow 240 bbls, ½-in, Morrison sand 6806 ft, 7-in csg 6805½ ft.

COLORADO WILDCAT

Yuma County — Failure: Mutual Oil Co.'s Pletcher 1, se se se 27-1s-46w, abdn 3608 ft.

KANSAS

Barton County—Feltes: R. E. Day's Feltes 4, n½ nw ne 14-16s-12w, Arb 3290 ft, 1000 gals acid, pump 21 bbls for 3 hrs, 3344 ft.

Barton County—Beaver: Bay Pet.'s Pefka 2-A nw sw se 22-16s-12w, cong 3375 ft, ns, abnd 3405 ft.

Barton County—Kraft-Prusa: Cities Service's Smith "D" 1, sw sw sw 1-17s-11w, Arb 3388 ft, pump 142 bbls, 3393 ft.

Gulf's Peterman 4, ne se se, 15-17s-11w, Arb 3287 ft, 2000 gals acid, swab 40 bbls in 1 hr, 3300 ft.

Barton County—Ames: Alco Valve's Robe 1, se nw ne 27-18s-11w, Lans 3023 ft, 1000 gals acid, pump 334 bbls, 3054 ft.

Barton County—Silica: J. H. Hershey's Brenn 1, ne ne ne 34-19s-11w, Lans 3073-85 ft, cong 3341 ft, 1000 gals acid, bail 3 gals oil 2½ gals wtr per hr, abnd 3429 ft.

Barton County—Hiss: Lotus Oil's Titus 1, ne sw nw 31-20s-13w, cherty cong 3513 ft, abnd 3548 ft.

Butler County—Brandt-Sensenbaugh: Adair-Morton's Ramp 6, c w½ w½ nw 23-28s-7e, Miss 2733 ft, vsso & sw, abnd 2750 ft.

Rex-Morris' Lemon "B" 2, sw ne se 23-28s-7e, Miss 2698 ft, 3000 gals acid, pump 100 bbls, 2721 ft.

Cowley County—Rainbow Bend: Ben Gralop's Hesket et al 1, se sw nw 19-33s-3e, Bart 3193 ft, Miss 3221 ft, shot 40 qts, pump 26 bbls in 8 hrs and pump off, td 3222 ft, pb 3221 ft.

Cowley County—Rahn: Hooper & Byrne's Rahn 1, nw ne sw 7-34s-6e, Arb 3377 ft, hfw, abnd 3402 ft.

Marion County — Lost Springs: Derby & Carey's Rogers Est. 5, ne sw se 9-17s-4e, Miss 2337 ft, pump 75 bbls, 12% wtr, 2367 ft.

McPherson County — Lindsborg: Mabee's Hedquist 2, w½ nw sw 5-17s-3w, Viola 3359 ft, 1500 gals acid, pump 91 bbls, td 3366 ft, pb 3364 ft.

Phillips County—Hansen: Cities Service's Templeton 3, sw sw sw 14-5s-20w, Lans 3201 ft, td 3578 ft, pb and abnd 3248 ft.

Reno County — Zenith: Auto Ordnance's Porter 3, c sw ne 7-24s-10w, Viola 3725 ft, 1550 gals acid, swab 41⅛ bbls, 10% wtr for 3 hrs, 3728½ ft.

Rice County—Chase: C. H. Weaver's Patton 1, c sw nw 17-19s-9w, Solid Arb 3293 ft, ns, abnd 3300 ft.

Rice County—Keesling: Phillips' Proffitt 3, c sw ne 8-20s-9w, Arb 3222 ft, 200 gals acid, pump 445 bbls, 3224 ft.

Russell County — Hall Gurney: Coralena's Horace Fink 2, c nw sw 15-14s-14w, Lane 3023 ft, 2000 gals acid, pump 77 bbls, 5% wtr, 3051 ft.

Russell County — Trapp: Transwestern & Western Explorations' Boomhower 7, w½ ne sw 19-15s-13w, Arb 3301 ft, 2000 gals acid, pump 240 bbls, 3317 ft.

Russell County—NW Sellens: Mid-Plains' Sellens "B" 1, sw ne se 22-15s-13w, Lans 3016 ft, 2000 gals acid, pump 184 bbls, 3040 ft.

Mid-Plains' Sellens 2, sw ne ne 22-15s-13w, Lans 3034 ft, 10,150 gals acid, pump 70 bbls, 3057 ft.

Mid-Plains & Zephyr's Sellens 1, sw se ne 22-15s-13w, owwo, KC 3039 ft, 2000 gals acid, pump 3000 bbls, 3382 ft.

Russell County—S. Big Creek: Stelbar's Mitchell "A" 1, nw se sw 6-15s-14w, Lans 2967 ft, 1000 gals acid, pump 1 gal per hr, td 3214 ft, pub and abnd 3026 ft.

Stafford County—Riley: Great Lakes Carbon's Wendelburg 1, ne se se 29-23s-11w, Lans 3310 ft, perf, pump 484 bo, td 3473 ft, pb 3459 ft.

Stafford County—Farmington: Skelly's Arthur 1, sw ne nw 34-24s-15w, Misener 4261-77 ft, shot 35 qts, flow 158 bbls, 4360 ft.

Trego County — Ellis: Stanolind's A. I. Cromb 1, w½ ne ne 1-13s-21w, Arb 3818 ft, 7000 gals acid, shot 40 qts, pump 4.65 bbls per hr for 17 hrs, 3850 ft.

KANSAS WELLS DEEPENED

Cowley County—Unnamed: Ralph Wixson's Clover 1, c se se 8-31s-7e, Lans 1950-55 ft, 1000 gals acid, 3000 gas, otd 1463 ft, deepened 2400 ft, pb 2268 ft.

Sedgwick County — Eastborough: Deep Rock's Shaffer 1, ne se nw 30-27s-2e, Viola 3259 ft, otd 2970½ ft, abnd 3260 ft.

KANSAS WILDCATS

Dickinson County—Failure: Wolf Creek & Crosbie's Brenizer 1, nw ne sw 35-12-2e, Lans

Wells Completed in United States in Week Ended December 25, 1943

Data preliminary and subject to revision. Revised and more complete data on all completions shown in monthly summary of drilling, published in second issue of each month. More detailed data on wildcats published in third issue of each month.

State or District	FIELD COMPLETIONS: New Wells *Oil	Gas	†Input	Dry	Total	Old Wells Deepened	WILDCAT COMPLETIONS *Oil	Gas	Dry	Total	ALL COMPLETIONS: This Week	Last Week	Cumulative: This Year	Last Year
Alabama	....	....	....	....	....	....	....	....	....	....	....	....	2	3
Arizona	....	....	....	....	....	....	....	....	....	....	....	....	5	3
Arkansas	7	....	....	....	7	....	....	....	1	1	8	6	220	230
California	19	1	....	1	21	....	2	....	1	3	24	36	1,441	826
Colorado	2	....	....	1	3	....	....	....	1	1	4	5	33	15
Florida	....	....	....	....	....	....	....	....	....	....	....	....	5	1
Georgia	....	....	....	....	....	....	....	....	....	....	....	....	1	2
Illinois	....	....	....	....	....	....	....	....	....	....	....	....	1,687	2,144
Indiana	•	....	....	....	....	....	....	....	....	....	....	....	254	395
Kansas	17	....	....	8	25	2	....	....	9	9	36	38	1,746	1,618
Kentucky	....	....	....	....	....	....	....	....	....	....	....	....	408	168
Louisiana	6	....	....	2	8	....	1	....	....	1	9	15	555	913
North Louisiana	....	....	....	....	....	....	....	....	....	....	....	5	207	.....
South Louisiana	6	....	....	2	8	....	1	....	....	1	9	10	348	.....
Michigan	6	....	....	1	7	....	....	....	4	4	11	15	603	666
Mississippi	....	....	....	....	....	....	....	....	....	....	....	....	35	101
Missouri	....	....	....	....	....	....	....	....	....	....	....	....	27	34
Montana	7	....	....	1	8	....	....	....	1	1	9	10	242	193
Nebraska	....	....	....	....	....	....	....	....	....	....	....	....	....	28
New Mexico	4	....	....	....	4	....	....	....	....	....	4	7	271	384
New York	15	2	10	....	27	....	....	....	....	....	27	27	1,246	1,228
Ohio	3	....	....	1	4	....	....	....	....	....	4	6	737	1,134
Oklahoma	15	3	1	7	26	....	....	....	2	2	28	37	1,469	1,454
Pennsylvania	31	2	16	1	50	....	....	....	....	....	50	54	2,736	3,845
Tennessee	....	....	....	....	....	....	....	....	....	....	....	....	6	9
Texas	54	6	....	16	76	4	4	2	22	28	108	141	4,368	5,198
E.Tex.Bor. Co.'s	....	....	....	....	....	....	....	....	....	....	....	....	18	.....
E. Texas Field	....	....	....	....	....	....	....	....	....	....	....	....	5	.....
Rest of E. Texas	4	....	....	1	5	....	....	....	....	....	5	6	251	.....
North Texas	12	1	....	10	23	1	2	....	8	10	34	38	1,089	.....
W. Central Tex.	1	....	....	3	4	....	....	1	3	4	8	9	394	.....
West Texas	15	....	....	....	15	3	....	....	3	3	21	29	971	.....
Tex. Panhandle	4	1	....	1	6	....	....	....	....	....	6	7	203	.....
G. Coast, Upper	5	....	....	....	5	....	....	....	2	2	7	10	338	.....
G. Coast, Lower	10	2	....	....	12	....	....	....	3	3	15	29	641	.....
Southwest Texas	3	2	....	1	6	....	2	1	2	5	11	12	372	.....
S. Central Tex.	....	....	....	....	....	....	....	....	1	1	1	1	67	.....
West Virginia	1	15	....	2	18	....	....	....	....	....	18	24	717	764
Wyoming	3	....	....	2	5	....	2	....	....	2	7	3	126	98
Total U.S.	190	29	27	43	289	6	9	2	41	52	347	424	18,940	21,454

* Includes distillate wells. † Includes salt water disposal wells.

1704 ft, Kinderhook 2418 ft, Hunton 2596 ft, Viola 2889 ft, Simp 3004 ft, Simp sd 3059 ft, Arb 3082 ft, abnd 3112 ft.

Graham County — Failure: Cities Service-Continental's Dodson 1, nw sw 28-9s-21w, cong 3887 ft, abnd 4024 ft.

Greenwood County—Failure: K. T. Weidman's Goodrich 1, se se se 30-27s-11e, Miss chat 1998 ft, solid lime 2009 ft, sso & 1 bw 2009-11 ft, Arb 2379 ft, abnd 2381 ft.

Leavenworth County—Failures: Chas. Miller's Stillings "A" 1, c se se 1-10s-21e, sd 1150-58 ft, ns, sd 1212-20 ft, ns, Miss 1220 ft, hfw 1260-80 ft, abnd 1345 ft.

Huisman et al's Bachelor 1, se se se 27-10s-21e, sdy lime 1205 ft, Miss 1216 ft, abnd 1230 ft.

Morris County—Failure: Dr. Franks et al's Nelson 1, c se sw 6-15s-7e, temp abnd 2300 ft.

Pratt County—Failure: Shell's Winter 1, sw ne ne 8-26s-12w, Anhy 720 ft, Topeka 3157 ft, Lans 3683 ft, Miss 4091 ft, Viola 4130 ft, Simp 4224 ft, Arb 4329 ft, abnd 4374 ft.

Reno County—Failure: Kingwood & Alpine's Kuhns 1, ne ne ne 22-24s-7w, Kinderhook 3862 ft, Viola 4080 ft, Simp 4110 ft, Arb 4196 ft, abnd 4240 ft.

Rooks County—Failure: Continental's Fleming 1, sw nw sw 27-8s-18w, owpb, set bridge 3215 ft, pb 3142 ft, 1000 gals acid, 6½ bbls wtr per hr, temp abnd.

SOUTH LOUISIANA

Beauregard Parish—Bear: Shell's Marler 1, 660 ft n, 710 ft e of sw cor 22-6s-9w, 5½-in 6530 ft, temp abnd 6530 ft.

Calcasieu Parish—Vinton: Gulf's Vinton Petroleum 1, 330 ft s&w of ne cor se nw 34-10s-12w, 5½-in 5550 ft, perf 5350-80 ft, flow 213 bbls, 5/32-in, 5850 ft.

Union Oil Company's Gray 17-G, 330 ft n, 330 ft w of se cor sec 28-10s-12w, 5½-in 5850 ft, perf 5807-5837 ft, flow 223 bbls, 9/64-in, td 5850 ft.

Jeff Davis Parish—Roanoke: Union Sulphur's Poole 1, 1665 ft s, 104 ft w of ne cor 2-9s-4w, abnd 7071 ft.

LaFourche Parish—Delta Farms: Humble's Hopkins 1, start ne cor sec 1, go w'ly alg nl 3261 ft, th s'ly to el for 660 ft, 1-17s-22e, 5½-in 9057 ft, perf 9028-48 ft, flow 365 bbls, ¼-in, td 9057 ft.

LaFourche Parish—Chacahoula: Sun's Dibert, Stark & Brown 18, 1483 ft n, 622 ft w of se cor 73-15s-15e, 7-in 8463 ft, perf 8030-45 ft, flow 232 bbls, 9/64-in, td 8463 ft.

LaFourche Parish—Leeville: Texas Co.'s Leeville 92, 2700 ft w, 4659 ft s of ne cor se¼ 34-21s-22e, 7-in 10,102 ft, perf 9924-50 ft, flow 265 bbls, ⅛-in, td 10,114 ft.

Terrebonne Parish—Northeast Gibson: Shell's Realty Operators 16-B, s 33° 7′ w 2322 ft on el sec 17 fr ne cor, th n 56° 53′ w 594 ft, 17-17s-15e, 5½-in 9539 ft, perf & set screen 9186-9213 ft, 300 bbls, 9/64-in, td 9540 ft.

SOUTH LOUISIANA WILDCAT

St. Martin Parish—Discovery: Amerada Petroleum's Bertinot-Quebedeaux 1, Arnaudville area, start nw cor sec 44 go s 15° 55′ w alg wl sec 44 for 4493 ft, th due e 5385 ft, 44-7s-5e, 5½-in 10,445 ft, perf 10,349-78 ft, 65 bbls, 5/32-in, td 10,700 ft. Opens field.

MICHIGAN

Allegan County—Trowbridge: Smith & Williams' Jones 1, ne sw ne 14-1n-12w, Otsego township, Traverse, abnd 1332 ft.

F. T. Cannon's Morgan 1, nw sw se 31-1n-13w, Traverse lime, pump 22 bbls, td 1323 ft.

Arneca County — North Adams: C. W. Teater's Collins 3, ne se se, 15-19n-3e, Dundee lime, flow 515 bbls 5 hrs, td 2875 ft.

Newaygo County—Goodwell: Cities Service's Billingsley 3, e½ se nw 8-14n-11w, Traverse lime 2796-2810 ft, flow 89 bbls 12 hrs, td 3458 ft.

Cities Service's Fetterle 2, e½ se sw, 9-14n-11w, Traverse 2799-2815 ft, pump 40 bbls, td 3458 ft.

Rex Oil & Gas Co.'s State A1, e½ nw nw 8-14n-11w, Traverse lime, flow 130 bbls 16 hrs, td 2837 ft.

Ottawa County—New Holland: A. S. Hoyt's Hoeksma 1, se se ne 35-5n-15w, Traverse lime, pump 15 bbls, td 1514 ft.

MICHIGAN WILDCATS

Allegan County — Failure: Oil Producers' Jones 1, ne sw ne 14-1n-12w, Traverse, abnd 1535 ft.

Ingham County—Failure: W. H. Colvin, Jr.'s Glasser 1, se se se 14-3n-1e, St. Peter sd 6580 ft, td 6599 ft.

Lapeer County—Failure: Ohio Oil Co.'s Harrington 1, n½ sw se 22-10n-10e, Dundee 2391 ft, td 2724 ft.

Van Buren County—Failure: S. L. McCall's Nelson 1, se se ne 29-1s-16w, Traverse, td 1150 ft.

MONTANA

Glacier County—Cut Back: Glacier Production Co.'s Storle 1, c ne nw 10-32n-5w, sso Cut Bank 2958-85 ft, abdn 3011 ft.

Grace Hagerty's Tribal 1, se se sw 24-32n-6w, Cut Bank 3092-3119 ft, swab 250 bbls 7-in 3092 ft, td 3126 ft.

A. B. Cobb & Co.'s Tribal 4-187, ne sw nw 19-32n-5w, swab 240 bbls, Cut Bank 2830-83 ft, 7-in 2832 ft, td 2885 ft.

Toole County—Kevin-Sunburst: Coolidge & Coolidge's Wait 7-A, nw sw se 13-35n-2w, 500 gals acid Ellis-Madison 1525 ft, pump 75 bbls, td 1533 ft.

Texas Co.'s Porter 1, nw sw se 2-34n-3w, pump 40 bbls, Ellis-Madison 1508-1520 ft.

Texas Co.'s Reeg 10, sw sw se 14-35n-2w, 500 gals acid Ellis-Madison 1453 ft, pump 69 bbls, td 1475 ft.

Toole County—High Gravity: Big West Oil Co.'s Government 1, nw se sw 13-35n-4w, 1000 gals acid, pump 35 bbls oil, 130 bbls wtr, Ellis-Madison 2430 ft.

Toole County—Kevin-Sunburst: Casper T. Engemoen 15, se ne sw 11-35n-2w, 1000 gals acid, pump 240 bbls, Ellis-Madison 1625 ft.

MONTANA WILDCAT

Teton County—Pendroy: Jarvis & Marcelle Wallenstein 1, c ne nw 18-27n-5w, abnd 2952 ft td, Madison 2615 ft so with sulphur water.

NEW MEXICO

Eddy County: Burnham Oil Co.'s State 2, c nw sw 2-17s-30e, flow 250 bbls, 2-in, 2922-33 ft.

Barney Cockburn's Etz 16, c nw ne 35-16s-30e, flow 50 bbls, 2-in, shot 140 qts 3030-79 ft.

O. H. Randol et al's State 3, 2-17s-30e, flow 160 bbls, 2-in, shot 430 qts 2895-3070 ft.

Lea County—Maljamar: Barney Cockburn et al's State-Shell 4, c sw sw 29-17s-33e, flow 200 bbls, 2-in, shot 160 qts 4221-4302 ft.

OKLAHOMA

Caddo County—W. Cement: Palmer's Sturba 6, ne sw sw 35-6n-10w, Oolitic 4960 ft, swab csg to 4000 ft, abnd 6425 ft.

Comanche County—Ft. Sill: Northern Ordnance's Spencer 2, sw nw sw 21-3n-10w, Sand 867-78 ft, 150,000 gas, td 1000 ft, pb 885 ft.

Creek County—SE Stroud: Phillips' Chapley 1, nw ne nw 17-14n-7e, Prue 2828 ft, shot 390 qts, flow 65 bbls, td 2895 ft, pb 2886 ft.

Creek County—Glenn: Gulf's Anderson-Clayton 1, se nw nw 9-17n-12e, Glenn 1492-1646 ft, repressure well, 1653 ft.

Garvin County — Pauls Valley: Stanolind-Pure-Phillips' Cashin Unit I 2, se ne se 31-4n-1e, Penn sd 4143-62 ft, Penn sd 4061-75 ft, flow 302 bbls oil, 467,000 gas, td 4233 ft, pb 4204 ft.

Pure-Continental's Collins-Hickman 2, nw sw sw 25-4n-1w, Pennsylvanian sd zone 3957-92 ft, Bromide 4017 ft, packer at 3994 ft, Penn prod flow 2219 bbls oil, 2,115,000 gas, Bromide prod flow 2804 bbls oil, 2,980,000 gas, 4071 ft.

Pure-Continental's McGrummen - Collins 2, se ne sw 25-4n-1w, Penn sd 3889-3939 ft, Bromide 3966 ft, packer at 3944 ft, Penn prod flow 1135 bbls oil, 1,494,000 gas, Bromide prod flow 2999 bbls oil, 2,989,000 gas, 4070 ft.

Stanolind-Amerada's J. T. Huckaby 1, se nw ne 25-4n-1w, Penn sd 3951 ft, flow 43 bbls, td 4225 ft, pb 4059 ft.

Lincoln County—Unnamed Pool: H. F. Wilcox's Murphy 1, ne sw sw 7-14n-6e, owpb, otd 3320 ft, Prue 3201-20 ft, shot 60 qts, pump 13 bbls oil, 11 bbls wtr, pb 3220 ft.

Lincoln County—Sporn: Skelly's Speer 1, se se ne 20-17n-3e, owpb, Bart 3890 ft, perf, pump 25 bo, otd 4655 ft, pb 4005 ft.

McIntyre County—Stidham: W. H. Pine's

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Simpson 1, nw sw sw 22-11n-15e, Booch 1053-85 ft, Cromwell 2472 ft, shot 15 qts, so. abnd 2541 ft.

Oklahoma County — W. Edmond: Sinclair Prairie's Ringer 1, c ne ne 6-13n-4w, Hunton 6944 ft, flow 992 bbls oil, 1,500,000 gas, 5090 ft.

C. C. Peppers' Arnold 2, c se sw 29-14n-4w, Hunton 6762 ft, 2000 gals acid, flow 960 bbls. 6880 ft.

Okmulgee County—Coalton: Deaner et al's Byrd 1B, se ne se 25-12n-13e, Cromwell 2218 ft, sd 2261-63 ft, shot 12 qts, 1,000,000 gas, 2265 ft.

Okmulgee County — Mounds: Whitfield's Newhouse 1, sw ne se 31-16n-12e, Dutcher 2243 ft, abnd 2260 ft.

Osage County—S. Hominey: Okla. P & W's No. 145, ne ne sw 30-22n-9e, Big Lime 1783 ft, 2,800,000 gas, 1795 ft.

Pittsburgh County—Unnamed: Public Service's Salman 5, c sw se 1-6n-15e, sd 207 ft, shot 250 qts, 7000 gas, 2291 ft.

Pottawatomie County—Unnamed: Wood Oil-Mid-Continent's LaReau 1, c se ne 19-6n-3e, Layton 3210-29 ft, Dense 4440 ft, swab wtr, td 4445 ft, pb and abnd 3238 ft.

Pottawatomie County—Gray: Huckleberry's Gray 3, sw sw sw 25-6n-4e, owwo, Wewoka series 2625-42 ft, pump 40 bbls, otd 3648 ft.

Pottawatomie County — St. Louis: H. F. Potts' Rhodd 1A, ne sw se 32-7n-5e, Earlsboro Zone 3133-49 ft, shot 100 qts, swab 18 bbls oil, 174 bbls wtr in 22 hrs, oil exhausted, 3150 ft.

Pottawatomie County—NE Earlsboro: Atlantic's Stargill 2, ne sw se 1-9n-4e, Hunton 4206 ft, perf, 5000 gals acid, flow 286 bbls in 7 hrs, 4336 ft.

Seminole County—Jackson: Mid-Continent's Williams 1, nw nw se 23-8n-7e, Booch 3163 ft, shot 20 qts, pump 35 bbls, 3181 ft.

Seminole County—S. Keokuk Falls: Carter's J. F. Brock 1, se se ne 15-10n-6e, owpb, Calvin 3337-90 ft, pump 119 bbls, otd 4199 ft, pb 3430 ft.

Stephens County — Tussy: Rockett Oil's Riddle 5, ne se nw 4-1s-3w, Tussy Lime 2357 ft, abnd 2557 ft.

Stephens County — Velma: Geo. Hollingsworth's Fee 3, se se se 36-1s-5w, lime 717-28 ft, abnd 769 ft.

Stephens County—Comanche: Calapor Oil Co.'s Howard 1, sw sw ne 24-2s-8w, lime 1770-78 ft, all sands showed salt wtr, abnd 2550 ft.

OKLAHOMA WELLS DEEPENED

Creek County—Glenn: Sinclair Prairie's J. G. Berryhill 8, ne nw nw 16-17n-12e, Glenn sand prod, pump 3 bbls oil, 8 bbls wtr, otd 1512 ft, 1556 ft.

Osage County—Prue: F. Quinn's Tribe 529, ne sw nw 26-21n-10e, Bart 1956 ft, shot 100 qts, pump 25 bbls oil, 15 bbls wtr, otd 1983 ft, 1987 ft.

OKLAHOMA WILDCATS

Beckham County—Failure: Okla. Nat. Gas Freeman 1, c nw ne 7-9n-21w, dolo 5003, abnd 5033 ft.

Seminole County—Failure: Mid-Continent's Willmott 1, ne ne sw 31-9n-8e, Sylvan 4355 ft, Viola 4400 ft, Dense 4440 ft, Wx 4485 ft, 2 Wx 4574 ft, co 4283-89 ft, abnd 4575 ft.

WEST TEXAS

Andrews County — Fuhrman: Shell-Cities Service's King 2, 1981 ft nsl 513 ft wel PSL 10, blk A-42, flow 1297 bbls, 2-in, acid 5000 gals 4340-4473 ft.

Andrews County—Marcho: Lion's University 2, 523 ft snl 660 ft ewl ne sec 2, blk 10, pump 99 bbls, shot 300 qts 4430-4605 ft.

Ector County—North Cowden: Stanolind's Midland Farms 2, Unit 3, 2041 ft ewl 885 ft snl G&MMB&A 46, blk 42, T-1-N, flow 657 bbls, 2-in, shot 280 qts 4644-4760 ft, td 4785 ft.

Stanolind's Midland Farms 10-D, 899 ft wel 1880 ft snl sw G&MMB&A 44, blk 42, T-1-N, flow 160 bbls oil, 4 bbls wtr, ¾-in, shot 310 qts 4666-4790 ft, td 4820 ft.

Gaines County — Cedar Lake: Stanolind's Green 4, 1988 ft snl 1989 ft ewl PSL 5, blk C-30, swabbed 387 bbls, shot 290 qts 4730-4825 ft.

Gaines County—Seminole: Amerada's Turlin 15, c se ne W. T. Ry. 218, blk G, flow 171 bbls, ½-in, acid 5000 gals, shot 150 qts 5224-5300 ft.

Gaines County—Wasson: Amon G. Carter's Wasson 7-D, 2200 ft nsl 1320 ft wel PSL 50, blk AX, flow 911 bbls, 2-in, acid 9000 gals, 4910-5046 ft.

Hockley County—Slaughter: T. F. Morrow et al's Mallet 51, 580 ft out ne cor lab 3, lge 48, Edwards CSL, flow 389 bbls, 12,000 gals acid 4880-4921 ft.

T. F. Morrow et al's Mallet 56, 580 ft out nw cor lab 2, lge 48, Edwards CSL, flow 413 bbls, 12,000 gals acid 4880-4920 ft.

Stanolind's Slaughter 26-A, lab 47, lge 37, Zavalla CSL, flow 1589 bbls, 11,000 gals acid 5009-76 ft.

Howard County: Continental's Clay 5-F, se se ne W&NW 138, blk 29, pump 124 bbls, 2000 gals acid 2420-2505 ft.

Pecos County — Apco: Skelly's Crockett 2-B, 440 ft fr sw 505 ft wel lse, Pink Phelps Vacancy, elev 2456 ft, Ellenburger 4420 ft, flow 789 bbls, ½-in, 1500 gals acid perf 4570-4674 ft, td 4705 ft.

Winkler County—Weiner: Texas Co.'s Hallet 5, 647 ft snl 777 ft ewl PSL 7, blk B-11, flow 292 bbls, ¾-in, shot 170 qts 3029-3124 ft, td 3134 ft.

Yoakum County—Wasson: Plymouth's Bennett 2-F, 990 ft ewl 330 ft nsl sec 614, flow 497 bbls, 2-in, 10,000 gals acid 5215-70 ft.

Plymouth's Waples-Platter 2, 510 ft nsl 1980 ft ewl sec 615, pump 156 bbls oil, 13½ % wtr, 16,000 gals acid 5100-5295 ft.

WEST TEXAS WELLS DEEPENED

Upton County—McCamey: Sinclair Prairie's Lane 1, sw sw sw GC&SF 5, otd 2080 ft, pump 106 bbls oil, 2 bbls wtr, pay 2045-2105 ft.

Shell's Bowen 20, 2478 ft snl 1650 ft ewl GC&SF 6, otd 2155 ft, pump 54 bbls oil, 15 bbls wtr, 1000 gals acid 2068-2168 ft, td 2173 ft.

Ward County: Humble's Richter 12, H&TC 27, blk 34, otd 2600 ft, pump 62 bbls, shot 295 qts 2600-2899 ft.

WEST TEXAS WILDCATS

Crockett County—Failure: John I. & P. D. Moore's Shannon 1-30, c se sw GC&SF Ry. 30, blk 1, abnd in sul w 2255-58 ft.

Lubbock County—Failure: John R. Sharp et al's Brown-Stanolind 1, c sw nw BS&F sec 113, blk C, elev 3223 ft, anhydrite 1355 ft, San Andres 2810 ft, San Angelo 4080 ft, brown dolomite 4650 ft, abnd 5000 ft.

Martin County — Failure: Mid-Continent's Mabee 1, c se nw G&MMB&A sec 1, blk 39, T-3-N, elev 2953 ft, San Andres 4825 ft, abnd 7535 ft.

WEST CENTRAL TEXAS

Brown County: D. D. Feldman et al's Butler 1, 1388 ft snl, 1540 ft ewl, lot 2, J. M. McGloin sur 789, abnd 1430 ft.

Eastland County: Texas Mineral Land Co.'s Hilburn 1, 1600 ft wel, 467 ft nsl, Wyatt Hickman sur 5, pump 97 bbls oil, 15% wtr, 2500 gals acid, shot 135 qts 3058-3126 ft.

Jones County—South Noodle: Cardinal Oil Co. et al's F. Carter 1, 440 ft wel, 467 ft snl sw T&P 33, blk 18, elev 1840 ft, Noodle Creek lime 2401 ft, Swastika 3070 ft, abnd 3073 ft.

Stephens County: Woodley Pet. Co.'s F. Thorpe 2, 1870 ft wel, 330 ft nsl, w½ S.P. Ry. 453, elev 1449 ft, Bend 318 ft, Marble Falls 3933 ft, Ellenburger 4092 ft, abnd 4280 ft.

WEST CENTRAL TEXAS WILDCATS

Jones County—Failure: Great Lakes Carbon Corp.'s Hall 1, c w½ sw sw BBB&C Ry. sec 164, elev 1554 ft, Cooke sd 1690 ft, Palo Pinto 3302 ft, abnd 3410 ft.

Stephens County—Gas Discovery: A. W. Cherry-Barron Kidd's White 1, 330 ft snl, 2300 ft wel, T&P 46, blk 7, elev 1418 ft, 5,897,000 gas, natural, sand 1841-56 ft, td 1859 ft.

Tarrant County—Failures: Dick Andrade-R. H. Dearing & Sons' Sharpless 1, 737 ft out of ne cor 69-ac tr, S. H. Thompson sur A-1504, elev 626 ft, Barnett 7350 ft, Ellenburger 8290 ft, abnd 8484 ft.

Sen. Jessie Martin-A. L. Moore-Leo Brewster's England 1, 2500 ft wel, 1700 ft nsl, R. Baker sur A-108, elev 786 ft, Barnett 7520 ft, Simpson 7895 ft, Ellenburger 8370 ft, abnd 8458 ft.

SOUTH CENTRAL TEXAS WILDCAT

Travis County—Failure: J. E. Schultz' Hibbs 1, 337-ac tr, Amos Alexander sur, abnd 1275 ft.

SOUTHWEST TEXAS

Duval County—Sejita: R. C. Lipscomb's Garcia 1-B, 467 ft fr sl 940 ft fr wl 3183 ft fr el s½ e½ 400-ac tr, Sam Pedro de Charco Redondo Gr, w flank, 5½-in 5904 ft, perf 5838-43 ft, 5825-35 ft, 5814-20 ft, flow 160 bbls, ½-in, td 5908 ft.

Jim Hogg County—Armstrong: Texas Co.'s Armstrong 3, 375 ft fr sl 1695 ft fr el SK&K sur 99, 1759-ac lse, 5½-in 3217 ft, no perfs, flow 205 bbls, ¼-in, td 3230 ft.

Starr County—Cameron: Continental's Cameron 4, 3628 ft fr wl 1649 ft fr el 2960 ft fr sl, George W. Smith sur, 6-in 4752 ft, perf 4907-4105 ft, flow 471,000 gas, ½-in, td 6262 ft.

Stanolind's Lyons 1, 160-ac lse, GB&CGNG sur 225, 5½-in 5213 ft, perf 4120-23 ft, flow 119 bbls, 3/16-in, td 4750 ft.

Starr County—Lockhart: Sun's McLean 6, 550 ft fr wl 1252-ac tr, porc 79 & 80, abnd 4460 ft.

SOUTHWEST TEXAS WILDCATS

Duval County—Failure: J. W. Gorman's Fee 1, 1320 ft fr wl 330 ft fr sl, sur 592, 480-ac lse, abnd 3193 ft.

Duval County—Discovery: Stanolind's Driscoll 2, 900 ft fr nl 1100 ft fr wl T&NO sur 6, 2 mi ne Strake field, 2800-ac lse, 5½-in 3815 ft, perf 3768-74 ft, pump 16 bbls 25.6-gr, td 3845 ft.

Duval County—Discovery: Pan American's Parr 1-B, Thomas-Lockhart area, 330 ft fr n&wl 82-ac lse, GH&H sur 115, 2 mi e Bridwell field, 5½-in 4725 ft, perf 4671-80 ft, flow 78 bbls, ⅜-in, td 4727 ft.

McMullen County — Discovery: Edwin M. Jones' Ezzell 102, 330 ft fr s&wl w½ nw¼ sec 10, Ezzell Rch, Patrick Fadden sur, 3 mi s Calliham, 5½-in 1265 ft, perf 1222-32 ft, 8,000,000 gas, td 1800 ft. Opens gas field.

Webb County—Failure: Dulup Oil Co.'s Garcia 1, 330 ft fr nl 1130 ft fr e&wl lse, GC&SF sur 607, 2½ mi sw McLean field, abnd 1942 ft.

SOUTHWEST TEXAS NEW PAY

Starr County—Ross: W. L. Goldston's Garza 2, 500 ft fr sl 1650 ft fr wl share 44, J. S. de la Garza porc 88, 451-ac lse, 5½-in 2856 ft, perf 2775-85 ft, flow est 8,000,000 gas, td 2875 ft.

LOWER TEXAS COAST

Dewitt County—Slick: Transwestern's Riedel 2, 450 ft fr se 520 ft fr swl 80-ac lse, W. C. Brown sur, 5½-in 7614 ft, perf 7600-05 ft, flow 165 bbls, 7/64-in, 7614 ft.

Jackson County—Little Kentucky: W. L. Pickens' Huseman 1, 467 ft fr nl 511 ft fr wl n 81-ac tr of 163-ac tr, lot 9, Morris & Cummins sur, 5½-in 5848 ft, perf 5704-08 ft, flow 124 bbls, 7/64-in, 5850 ft.

Jackson County—Mauritz: H. M. Cohen's Mauritz Bros. 1-C, 330 ft fr s&wl 85-ac tr, w cor D, White sur, 5½-in 5699 ft, perf 5600-10 ft, flow 84 bbls, 3/32-in, 6515 ft.

Jackson County—West Ganado: Pure's Eversburg 2, 450 ft fr s&wl 1514 ft fr nwl 152-ac lse, William Menefee sur, 5½-in 4769 ft, perf 4752-66 ft, flow 66 bbls, 3/32-in, 4769 ft.

Jackson County—West Ranch: Magnolia's West Ranch 255-A, 2040 ft fr nel of 11,582-ac lse, V. Garcia & R. Musquez Grs, 5½-in 5076 ft, perf 5018-68 ft, flow 110,000,000 gas, 5076 ft.

Magnolia's West Ranch 256-a, 3320 ft sw of most e'ly nl 11, 582-ac tr, R. Musquez & V. Garcia Grs, 7-in 5095 ft, perf 5044-94 ft, flow est 25,000,000 gas, 5095 ft.

Jim Wells County—Seeligson: W. A. Richardson's Hood 1, 330 ft fr s&el blk 10, sec 49, Halderman subdvn, Richard Ross sur 334, dual comp 5½-in 6182 ft, perf 4870-62 ft, flow 99 bbls, ⅛-in; perf 5908-26 ft, flow 156 bbls, ⅛-in, td 6250 ft.

Sun's Canales 22, 660 ft fr nl 440 ft fr wl, A. Canales sur 64, dual comp, 5½-in 6018 ft, perf 5382-95 ft, flow dry gas; perf 5941-50 ft, flow 272 bbls, ⅛-in, td 6020 ft.

Sun's Canales 24, 990 ft fr el 3300 ft fr wl 3145 ft fr nl, J. E. Stevens sur 364, dual comp, 5½-in 6038 ft, perf 5242-50 ft, flow 108 bbls, ⅛-in; perf 6016-26 ft, flow 142 bbls, ⅛-in, td 6040 ft.

Transwestern's Seeligson 14-B, 660 ft fr nl 1788 ft fr el 1318-ac lse, secs 64 & 67, Seeligson Rch Y. Canales sur 288, dual comp, 5½-in 6206 ft, perf 5220-25 ft, flow 96 bbls, 7/64-in; perf 5975-82 ft, flow 100 bbls, 7/64-in, td 6250 ft.

Kleberg County—Seeligson: Humble's King Ranch-Cabeza 22, 660 ft fr wl 1158 ft fr sl, L. Bazan sur 18, 5½-in 6094 ft, perf 5202-08 ft, flow 113 bbls, ⅛-in, 6095 ft.

LOWER TEXAS COAST WILDCATS

Cameron County—Failure: Great Lakes Carbon Corp.'s Yturria Land & Livestock 1, 17,000 nw fr nwl share 3, th 260 ft ne at ra, Yturria sur 696, abnd 6007 ft.

Karnes County—Failure: Adams Oil & Gas Hunt 1, 495 ft fr se&swl 75-ac lse, sw½ 150-ac lse, A. M. Thompkins sur, abnd 8507 ft.

Victoria County—Failure: Rowan & Hope's Bucher 1, 467 ft fr ne&se'ly sel 166-ac lse, abnd 4505 ft.

LOWER TEXAS COAST EXTENSION

Bee County—Blanconia: Pure's May 1, 485 ft fr nl 576 ft fr wl 200-ac tr, Michael O'Donnel sur 50, 5½-in 4998 ft, perf 4965-68 ft, flow 69 bbls, ⅛-in, td 4998 ft, extends prodn 3700 ft sw.

TEXAS GULF COAST

Fort Bend County—Clodine: Providence Oil Co.'s Hatfield 5, 467 ft fr n&el of sw cor 360-ac lse, H. D. Brown sur, 5½-in 7502 ft, perf 7498½-7500 ft, flow 114 bbls, 7/64-in, td 7504 ft.

Liberty County—Kirby: General Crude's Barber 1, 58-ac tr, 450 ft fr sl 470 ft fr el lse, ne Welch-Fee 5-B, 5½-in 7240 ft, perf 7080-7100 ft, 7110-40 ft, flow 65 bbls, ⅛-in, td 9723 ft.

Waller County—North Katy: Stanolind's Pattison 2, 1976 ft fr wl, 3308 ft fr sl, 3312 ft fr el sec 96, 640-ac lse, J. M. Bennett sur, 6⅝-in, 7387 ft, perf 6628-29 ft, flow 157 bbls, ⅛-in, td 7400 ft.

TEXAS GULF COAST WELL RECOMPLETED

Liberty County — Cleveland: Gulf's Kirby Lumber 8, 3405 ft n alg wl, John Pleasant sur, fr ne cor James Eldridge sur, 4615 ft e at ra, originally comp as gasser 2-28-35, shut in, reopened, flowed oil 11-9-43, flow 204 bbls 41.4-gr, ¼-in, t/sand 5722 ft, td 5753 ft.

TEXAS GULF COAST WILDCATS

Brazoria County—Failure: Glenn H. McCarthy's Munson 1-A, 1060-ac tr, Asa Mitchell sur, 5½ mi se West Columbia, abnd 11,700 ft.

Jefferson County—Failure: Glenn H. McCarthy's Texas Public Service 1, 1000-ac tr, William McFarland sur, 6 mi se Nome, abnd 9520 ft.

TEXAS GULF COAST EXTENSION

Chambers County—Stowell: Gulf's Williams 1, 1800 ft fr sl, 643 ft fr wl, lot 85, Koch subdvn, 102-ac tr, F. Valmore sur, dual completed, 5½-in 7768 ft, perf 7640-60 ft, flow 349 bbls, 3/16-in; perf 7590-7610 ft, 305 bbls, ¼-in, td 7841 ft.

EAST TEXAS

Houston County—Grapeland: Geier-Jackson Recycling Co.'s Pridgen-Daily 2, 1000 ft wel 467 ft fr m/n/nw line lse, J. D. J. Procella sur, elev 375 ft, Woodbine 5908 ft, 95,000,000 gas, 25-30 bbls distillate per million, perf 5910-22 ft.

Wood County—Hawkins: Humble's Price 2-B, 425 ft nsl 2450 ft wel, Geo Brewer sur, elev 351 ft, Woodbine 4652 ft, abnd 4954 ft.

Wood County—Quitman: Shell's Kirkland-Watson 1, 2300 ft wel 3600 ft snl, E. Goodsir sur, elev 428 ft, Paluxy 6282 ft, top water 6338 ft, flow 492 bbls, ¼-in, perf 6288-6322 ft, td 6477 ft.

Shell's Smith 1, 2350 ft nsl 660 ft ewl, Ed Goodsir sur, elev 409 ft, Paluxy 6126 ft, oil sand 6190 ft, water 6310 ft, flow 54 bbls, ¼-in, perf 6140-50, 6184-6218, 6242-54 ft, td 6350 ft.

Shell-Peacock & Smith's Blalock-Kirkland 1, 725 ft ewl 2450 ft snl, S. G. Purse sur, elev 447 ft, Paluxy series 6274 ft, sand 6298 ft, flow 508 bbls, ¼-in, perf 6290-6330 ft, td 6483 ft.

NORTH TEXAS

Archer County: M. W. Blair Oil Co.'s Henry 4, 1800 ft snl 2790 ft wel sec 35, blk 5, Clark-Plumb sur, abnd 1208 ft.

Henry Grace Prod. Co.'s Carpenter 18, 750 ft snl 865 ft ewl sec 39, blk 4, Clark-Plumb sur, abnd 1151 ft.

Hedrick Oil Co.'s Carter 3, 1320 ft nsl 590 ft ewl sec 21, blk 5, Clark-Plumb sur, pump 25 bbls, 879-82 ft.

Hedrick Oil Co.'s Carter 4, 920 ft nsl 990 ft ewl sec 21, blk 5, abnd 894 ft.

Hedrick Oil Co.'s Carter 5, 1320 ft nsl 1390 ft ewl sec 21, blk 5, pump 15 bbls, 883-88 ft.

J. A. McCarty-Coleman's Taylor 6-A, 330 ft out ne cor lot 13, ATNCL sec 17, elev 1035 ft, pump 45 bbls, 1638-40 ft.

Archer County—Vogtsberger: Jennings Dr. Co.'s Votsberger 1, 705 ft nsl 467 ft ewl n½ sec 1, German Emigration Co. sur, KMA 4340 ft, pump 35 bbls, shot 330 qts 4768-4802 ft.

Archer County — Little Wichita: Phillip Wilson-Barclay 1, 2068 ft wel 660 ft nsl of w-1280 ac, Wm Walker sur, junked 3675 ft.

Clay County: F. H. Gohlke et al's Saner 1, 564 ft fr swl 100 ft fr nwl blk 63, Saner-Lomax sur, abnd 1194 ft.

Geo. Golden et al's Myers 4, 750 ft fr nwl 330 ft fr swl se-50 ac tr, blk 49, Bacon sur, abnd 1152 ft.

W. H. Spradling et al's Taylor-Elliott 1-A, 1400 ft nsl 1350 ft wel blk 56, Bacon sur, abnd 1147 ft.

Cooke County: Benson Bros. et al's Fleitman 3, 1067 ft wel 2291 ft nsl, A. Patterson sur, pump 36 bbls, shot 4 qts 1018-27 ft.

Texas Co.'s Trubenbach 33, 400 ft snl 2120 ft wel of 203-ac tr, lot 8, J. Clark sur, pump 28 bbls, shot 10 qts 808-15 ft, td 823 ft.

Jack County — McDonald: Champlin Ref. Co.'s Tibbs 1, 385 ft nsl 1030 ft wel lot 6, Wm. McDonald sur A-1073, flow 600 bbls 42-gr, ¾-in, Strawn sand 3480-86 ft.

Montague County—Hildreth: Whitaker Oil Co.'s Gadberry 1, nw nw se sec 56, J. A. Staley sur, Bend 6128 ft, flow 1488 bbls, ½-in, perf 6180-6218 ft, td 6450 ft.

Throckmorton County: Roy Sharrock et al's Putnam 1, 150 ft snl 2700 ft wel sec 9, Comanche Indian Res., 4,500,000 gas, 605-637 ft.

Wichita County: Bell O&G Co.'s Reese-Fisher 1, 450 ft nsl 300 ft wel of n-306¼ ac of s-644.81 ac sec 2, C. T. Ry. sur A-395, Canyon 1543 ft, Cambrian 1974 ft, abnd 2093 ft.

H. S. & C. B. Grace's Dunn 2, 150 ft nsl 550 ft ewl blk 2, W. H. Anderson sur A-1, pump 8 bbls 399-424 ft.

Hull & Jones' Waggoner Bros. 1-A, abnd 883 ft.

Texas Co.'s Waggoner Est. 443-A, 2300 ft snl 1650 ft ewl GC&SF sec 20, pump 6 bbls, shot 5 qts 541-547 ft.

Louis Welch et al's Davis 1, 626 ft snl 217 ft ewl sec 28, Tarrant CSL sur, pump 2 bbls oil, 2 bbls wtr, 638-642 ft.

Wilbarger County: Consolidated-W. T. Waggoner Est's Fee 10-GG, 1717 ft snl 3270 ft wel H&TC 36, blk 6, flow 66 bbls, 2-in, 3000 gals acid 3788-3815 ft, td 3821 ft.

Young County: Chas. King et al's Perkins 9-A, TE&L sec 206, abnd 765 ft.

R. J. Watson et al's Routon 1-A, 930 ft snl 200 ft wel TE&L sec 265, abnd 750 ft.

NORTH TEXAS WELL DEEPENED

Wichita County: Magnolia's Reilly 42, 850 ft nsl 300 ft ewl tr, L. C. Denison sur A-55, otd 732 ft, pump 50 bbls, perf 1508-13 ft, td 1517 ft.

NORTH TEXAS WILDCATS

Archer County—Failures: R. L. Bennett et al's Veasey 1, 660 ft out cor s-225 ac BBB&C Ry, sec 7, abnd 1350 ft.

A. R. Dillard et al's Wilson-McCory 1-A-T, 660 ft wel 710 ft snl ATNCL sec 111, abnd 1528 ft.

N. D. Goldsmith et al's Morrison 1, 450 ft nsl 150 ft wel lot 16, Crawford subdiv, I. Holman sur, abnd 1232 ft.

Clay County—Discovery: Shell's Wynn 1, 330 ft out sw cor 311.8-ac lse, C. Rooney sur A-392, elev 1040 ft, Palo Pinto 2820 ft, KMA 3645 ft, Bend 5845 ft, Bend cong 5974 ft, Miss 6174 ft, Simpson 6490 ft, Ellen 6706 ft, flow 1998 bbls 45.6-gr, 48 bbls wtr, 2-in 500 gals acid Miss perf 6190-6283 ft, td 6795 ft.

Cooke County—Failures: Bridwell Oil Co.'s Campbell 3, 750 ft snl 1200 ft wel, O. F. Leverett sur A-607, abnd 1416 ft.

F. W. Lausen and C. L. Wagner's Bonner 1, 330 ft out se cor, F. J. Lindheimer sur, abnd 3527 ft.

Denton County—Failure: Sohio Prod. Co.'s Sanders 1, 330 ft out nw cor, A. C. Warren sur A-1387, Ellenburger 2506 ft, abnd 2675 ft.

Haskell County—Failure: Hunter-Hunter & Sohio Prod. Co.'s Wood 1, 3000 ft snl 6440 ft wel, L. Dyches sur 46, A-119, Palo Pinto 3407 ft, abnd 3483 ft.

Montague County—Discovery: Continental's Spencer 1, 330 ft out sw cor E. Green sur A-308, elev 990 ft, pump 73 bbls 41-gr, shot 10 qts 2774-78 ft, td 4342 ft, pb 2778 ft.

Throckmorton County—Failure: B. Sullivan and Anderson-Prichard Oil Corp's Waggoner 1, 330 ft snl 1536 ft wel TE&L sec 775, Bend 4093 ft, Miss 4696 ft, Ellen 4910 ft, abnd 4938 ft.

WYOMING

Park County—Badger Basin: Resolute Oil Corp.'s Northern Pacific 3, c ne nw 17-57n-101w, Frontier sand 8130 ft, pump 100 bbls, 7-in 8130 ft, td 8660 ft.

Sweetwater County—Wertz: Sinclair Wyoming Oil Co.'s Wertz E-31, ne ne se 12-26n-90w, abnd Tensleep 6774 ft.

Weston County—Osage: C. L. Foster's Trustee 5, nw sw se 7-46n-63w, abdn shale 900 ft.

Park County—Elk Basin: Stanolind's Elk 19-T on 5, ne sw nw 30-58n-99w, flow 95 bbls hr, Tensleep 4445-4675 ft, 6⅝-in 4456 ft.

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Park County—Frannie: Stanolind's Rosenburg 16-xm "C", se nw nw 25-58n-98w, swab 480 bbls, Tensleep 2660-3000 ft, td 3343 ft, pb 3000 ft.

WYOMING WILDCATS

Hot Springs County—Gebo Dome: Continental's Unit 1, sw nw se 23-44n-95w, elevation 4735 ft; 1500 gals acid, flow 4320 bbls ¾-in, Embar 4735-4842 ft, td 5309 ft.

Niobrara County—Lance Creek: Ohio Oil Co.'s Converse Sheep 8, nw se sw 32-36n-65w, Bell sd 5482 ft, Madison 5633 ft, elevation 4376 ft, pump 40 bbls, 90% water, fourth Leo sd 5352 ft, td 5692 ft, pb 5420 ft.

TEXAS PANHANDLE

Carson County: L. R. Hagy & Harrington's Dauer 1, c se nw H&GN Ry 237, blk B-2, pump 38 bbls, shot 130 qts 3080-3121 ft, td in granite 3122 ft.

Gray County: L. R. Hagy & Harrington's Herber 3, 1980 ft nsl, 1950 ft ewl, H&GN Ry 184, blk B-2, pump 82 bbls, shot 300 qts 2910-90 ft, td 3181 ft, pb 3175 ft.

Harry Stekoll et al's Short 8, 330 ft out of ne cor J. C. Short sur, elev 2991 ft, abnd 2900 ft.

Texas Co.'s Saunders 40, 330 ft nsl, 1342 ft ewl nw H&GN 12, blk A-6, pump 100 bbls, shot 240 qts 2875-2931 ft.

Hutchinson County: J. E. Crosbie's Pitts 56, 2420 ft fr m/w/e, 990 ft fr m/n/s, T.C. Ry 7, blk M-21, pump 276 bbls, shot 390 qts 2745-2845 ft.

Wheeler County: Gibson Oil Corp.'s Parr-Texaco 1, ne ne ne H&GN 82, blk 17, elev 2134 ft, 5,400,000 gas, 265 lbs rp, shot 170 qts 1955-2025 ft, td 2135 ft.

United States Wildcat Starts

CALIFORNIA

Kern County: Amerada's S. P. 2-15, sw nw nw 15-29-29, Ant Hill area, about 4 m s of Round Mountain, mim.

COLORADO

Cheyenne County: R. A. Martinson & Associates' 1, c sw ne 24-13s-49w, Kit Carson, loc.

ILLINOIS

Bond County: Sun's R. O. Young 1, c ne sw 7-6n-4w, dr.

Clark County: Frank Mitchell et al's H. Weir 1, sw ne se 12-9n-13w, dr.

Gallatin County: E. P. Jarvis & Marcell's R. Davis 1, ne sw 1-8s-8e, dr.

Jefferson County: Kiowa Drlg. Co.'s Smith-Webb Comm 1, sw sw se 20-2s-4e, dr.

Lawrence County: George & Wrather et al's Effert 1, ne se nw 26-4n-12w, dr.

Wayne County: Stanolind's Seifert-Fisher Comm. 1, w½ sw nw 35-2s-9e, lcn.

Kingwood's Burkett 1, sw sw nw 26-1n-5e, lcn.

Wiser Oil Co.'s Wells 1, nw sw nw 30-2n-9e, dr.

INDIANA

Daviess County: E. S. Holman's O. B. Wilson 1, se ne se 24-1n-6w, lcn.

Gibson County: Superior's J. F. Hull 1-B, nw nw ne 26-1s-11w, lcn.

Superior's J. Hardiman 1, nw ne nw 7-2s-11w, dr.

KANSAS

Barber County: Great Lakes Carbon's Davenport 1, c se sw 34-31s-11w, lcn.

Cowley County: Continental's R. M. Davis 1, nw nw ne 3-34s-6e, lcn.

Ellis County: B & R Drilling Co.'s National Loan Co. 1, s½ se nw 1-12s-16w, lcn.

Greenwood County: Ward McGuines' Nesbitt 1, nw ne se 28-24s-11e, rum.

Kiowa County: Aladdin Pet. Co.'s Piester 1, sw sw nw 24-29s-16w, dk.

Rice County: Ingling & Parker & Weber Dental Mfg. Co.'s Evans 1, c nw sw 34-20s-8w, dr 1715 ft.

Rooks County: Lotus Oil's Young 1, sw sw sw 25-8s-19w, woc.

Trego County: J. M. Huber & Dick Barnett & Aylward Prod.'s, w½ ne ne 26-12s-21w, lcn.

KENTUCKY

Adair County: Dobbs Oil & Gas Co.'s Ralph Corbin 1, 60-ac tr near Green River, dr 129 ft.

Allatin County: Gulf's H. Christian 1, 15-V-74, comp.

Butler County: G. P. Gill's T. Forgy 1, 1-G-32, dr.

Daviess County: A. Teller et al's F. D. Johnson 1, 13-N-28, lcn.

Henderson County: Carter Oil Co.'s G. C. Ginger 1, 20-P-24, lcn.

Hopkins County: Pure's G. B. Hewlett 1, 5-K-26, lcn.

MICHIGAN

Muskegon County: E. B. Strom's Rettenhouse 1, nw se se 24-9n-15w, dk.

MONTANA

Carbon County: Ohio Oil Co.'s Northern Pacific 18, c ne sw 3-7s-21e, Dry Creek field, loc Tensleep test.

OKLAHOMA

Garfield County: Sohio Prod. Co.'s Schroeder 1, se se se 29-23n-4w, lcn.

Garvin County: Ramsey Petroleum's McDowell 1, ne se 13-3n-1e, mit.

Kay County: Ingling & Parker's Stone 1-A s½ se se 30-25n-1e, lcn.

Noble County: Aladdin Pet. Co.'s Berdicek 1, ne ne nw 13-20n-1w, lcn.

Pottawatomie County: Stanolind's Werrell 1, nw nw nw 9-7n-3e, lcn.

Stephens County: D. L. Husted's Gibson 1, sw nw sw 21-1n-7w, dr 1602 ft sd & sh.

Helmerich & Payne's Mauldin 1, se se sw 2-3s-4w, pits & rig on ground (4500-ft test).

WEST TEXAS

Andrews County: Mid-Continent's University 1-7, c sw se sec 20, blk 13, lcn Clear Fork test.

Texas Co.'s A. W. Pattilos 1, c sw sw PSL 22, blk A-36, lcn.

Crane County: J. D. Bodkins et al's C. W. Hobbs-Shell 1, c w¼ of w¼ H&TC 36, blk 35, lcn Ellenburger test.

Crockett County: John I. and P. D. Moore et al's Todd-Amerada 1-14, c sw se E. L. Ry. 14, blk YZ, lcn Ellenburger test.

Gaines County: Northern Ordnance's N. B. Birge 1, c se se PSL 1, blk C-43, lcn 5600-ft San Andres test.

SOUTHWEST TEXAS

Duval County: American Republic's Kreis 1, 466 ft n, th 466 ft w fr ctr sur 228, 3 mi e Kreis field, ru.

Hiawatha Oil & Gas' Miller 15, 3159-ac lse, 1 mi nw Longhorn field, se 22, Santos Flores Gr, lcn.

Webb County: Charles E. Fraser's Bruni 1, 120-ac tr, BS&F sur, 7 mi sw Bruni, lcn.

Charles E. Fraser's Bruni 2, 330 ft fr nl & 1602 ft fr wl sw CMRR sur 447, lcn 3250-ft test.

SOUTH CENTRAL TEXAS

Williamson County: H. C. LeFors' Kruse 1, 100-ac lse, Francis Bradley & C. W. Baker sur, lcn 800-ft test.

Zapata County: Ralph E. Fair's Flores 2, 40-ac lse, blk 39, share 1, porc 36, 2 mi n Zapata, lcn 3000-ft test.

LOWER TEXAS COAST

Jackson County: W. Stewart Boyle's Barron 1, 82-ac lse, Woolfolk subdvn, Jeremiah Heard sur, lcn 7500-ft test.

Jim Wells County: Humble's San Antonio Joint Stock Land Bank 1, 1014-ac tr, J. Wright sur, 1½ mi sw Alfred, lcn 5500-ft test.

Karnes County: Continental's Kinnear 1, 40-ac lse, Brooks & Burleson sur 3, 3 mi se Runge, lcn.

D. R. Perkins & T. C. Hadley's Johnson 1, 150-ac tr, Carlos Martinez Gr, 4 mi sw Kenedy, 390-ac tr, lcn 6250-ft test.

D. R. Perkins & T. C. Hadley's Wolf 1, se 80-ac tr of 240-ac tr, LPOA&M Co. sur, sw Kenedy, lcn 6250-ft test.

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TEXAS GULF COAST

Fort Bend County: Superior's Lockwood 1, 710-ac lse, William McMahon sur, 5½ mi sw Thompsons townsite, lcn 9000-ft test.

Jefferson County: Glenn H. McCarthy's McFaddin Trust 2, 320-ac tr, East Stowell area, T&NO sur, lcn 10,000-ft test.

Stanolind's Fee-Caswell 1, West Beaumont area, 891-ac lse, 12 mi w of Beaumont, W. D. Dyches sur, lcn 7500-ft test.

Polk County: Humble's Carter & Bros. 1-C, Segno area, 1070-ac lse, James H. Finley sur, 3 mi nw Segno field, lcn 10,000-ft test.

San Jacinto County: American Liberty's Humble's Foster 1, Cold Spring area, 610-ac tr, Linda Saunders sur, lcn 11,000-ft test.

Trinity County: American Liberty's Southern Pine 1, 160-ac lse, S. H. McClain sur, 10 mi nw Apple Springs, lcn 5200-ft test.

Walker County: W. E. Allaun's U.S.A.-Central Coal & Coke 4, 40-ac unit, 4 mi nw New Waverly, lcn 7000-ft test.

EAST TEXAS

Camp County: Tide Water-Seaboard's J. D. Credille 1, 467 ft fr nw&swl 150-ac tr, Obediah Hendricks sur A-57, 7 mi se Pittsburg, lcn Travis Peak test.

Limestone County: Zephyr Oil Co.'s Nussbaum-Scharff 1, 700 ft ewl 330 ft nsl 76-ac tr, S. H. Bates sur, elev 496 ft, Pettit test, cem sur pipe.

Squeaks from the Bull Wheel

We Dare Not Tell You Where

It happened in one of our larger stores during the rush hour. The elevator was jammed and the cables groaned. The elevator rose slowly, and as it neared the third floor a piercing scream caused the operator to stop the car midway. All eyes were focused on a large woman in a short, seal jacket, who wore an injured expression. A small boy, not yet of school age, stood directly behind her. "I did it," he announced truculently. "It was in my face, so I bit it."

Shock

A business man visiting Washington met a young lady and took her to dinner and a night club. Late in the evening he put his arm around her and whispered in her ear. "No!" she screamed. "Positively no!" And she slapped his face. He fainted. When he revived she asked, "Was that slap such a hard one?"

"Not at all," he replied. "I fainted because, after all these months, that's the first definite answer I've received in Washington."

He Asked For It

"This is insufferable! Are you mad, or am I?"

"Oh, surely your excellency would not keep a servant who is mad."

Margin for Truth

The bishop was exhorting a women's society to greater zeal:

"When I was a young priest," he said by way of illustration, "I was in charge of a parish notable for its lack of interest. One cold and rainy night Michael, the 250-pound janitor, and I arrived to perform our respective duties for an announced meeting. Not another soul appeared.

"The following week the diocesan paper noted that 'a large and enthusiastic audience attended the meeting.' Much atsonished, Michael called it to my attention:

" 'Large and enthusiastic! Humph,' he growled in honest indignation. 'Why, your riverence, you know there wasn't a soul there except you and mesilf.'

" 'Yes, Michael, but the item is perfectly true,' I pacified. 'You see, you are large, and I am enthusiastic.' "

It's a Pun

The new overseer in the factory was talking things over with the manager.

"One thing worries me," he explained, "the women here never stop talking, all the time they're at work."

"Surely you must realize," said the manager in reply, "that women's work is never dumb."

Finesse

Knowing that the minister was very fond of cherry brandy, one of the church elders offered to present him with a bottle on one consideration—that the pastor acknowledge receipt of the gift in the church paper.

"Gladly," responded the good man.

When the church magazine came out a few days later, the elder turned at once to the "appreciation" column. There he read:

"The minister extends his thanks to Elder Brown for his gift of fruit and the spirit in which it was given."

That Fabulous Shipbuilder

A young lady who was to christen one of the ships built by Henry Kaiser, arrived at the yards and was greeted by Kaiser, who escorted her to a gaily decked platform and handed her the appropriate bottle.

Considerably mystified, since the only sign of a vessel was a keel far below her, the young lady turned to her host asking where the ship might be.

"Hurry up," Kaiser shouted, "get swinging."

Practicing Conservation

A negro began to develop an increasing aptitude for avoiding work. Every time the foreman looked for George, he'd find him behind the rain barrel, sitting in the sun. Finally, taking the veteran to task, the foreman asked why he didn't stop loafing and buckle down to work.

"Boss," replied the negro, "Ah hears tell good men am mighty scarce dese days, so Ah says to mahself, 'George, yo' bettah take good care o' yo'se'f'."

The Summing Up

Down in Alabama, Levi, a farmhand, was plowing corn, when a sudden thunder shower drove him to shelter under a tree. There his Maker suddenly summoned him home with a bolt of lightning.

Over the shattered remains of the defunct Levi the local negro pastor orated lustily, while the congregation swayed and moaned, concluding with this moving climax:

"De call for our pore brother wuz swift and suddin. He did not linger for long months on de bed of pain and affliction. He did not suffer and waste away. No, suh, de Lawd just teched an electric button in the skies and summarized Levi!"

Doing His Duty

Henry, I saw you kissing the maid and I'm going home to mother.

But I was only trying to get her to stay with us, dear.

Oh, that's different—did you convince her?

"Every dime and dollar not vitally needed for absolute necessities should go into WAR BONDS and STAMPS to add to the striking power of our armed forces."
—*President Roosevelt*

EVERYBODY EVERY PAYDAY 10%

IN WAR BONDS

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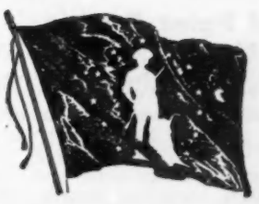
New Goal for Payroll Savings Plan!

Along with increased war production goals go increased costs . . . extra billions which must be raised, and raised fast, to win this war. That means we must raise our sights all along the line, with every firm offering every American with a regular income the chance to buy more *War Bonds*. YOUR help is asked in encouraging employees to put at least 10 percent of their pay into War Bonds every payday, through the Payroll Savings Plan. For details of the Plan, approved by organized labor, write, wire, or phone Treasury Department, Section T, 709 12th St. N. W., Washington, D. C.



U.S. WAR SAVINGS BONDS

This space contributed to America's All-Out War Program by

THE OIL WEEKLY

Notes for the Equipment Buyer and User

Spotlight for Welding

GENERAL ELECTRIC COMPANY

General Electric Company, Schenectady, New York, has developed a new spotlight designed to provide glareless illumination of sufficient intensity for an arc-welding operator to see his work distinctly through the dark lens of a welding helmet prior to striking the arc.

This new spotlight is especially desirable for welding in which the establishment of the arc must be made quickly and accurately, such as in the welding of thin materials, light alloy castings, etc.

Fatigue is reduced through use of the spotlight also, since it is not necessary for the operator to lift his helmet before striking the arc. Spoilage of exacting work is also cut down because the operator can strike the arc precisely where required.

Mounted on an upright, telescoping metal standard and set firmly in an 18½-inch diameter, 30-pound cast iron base for stability, the spotlight consists of three 300-watt reflector spot lamps surrounded by a circular shade. Rated to give 1000 hours of continuous operation at 120 volts, the lamps are mounted in adjustable porcelain holders, so that the area covered by the light beam can be increased from a single, sharp spot 7 inches in diameter to a clover leaf shaped pattern approximately 17 inches across at its widest point.

The light can be raised or lowered on its standard, and held securely in place by a locking thumb screw, to any point from 45 to 76 inches above the base. A universal, friction ball-joint between the shade and the upright standard permits the light beam to be directed and held at any angle downward between vertical and 30 degrees below horizontal.

Controlled by a foot-operated switch which is depressed by the operator while the arc is struck, the unit is equipped with a 10-foot, oil-proof, heavily jacketed cable, with plug for connecting the light to the electric circuit. Except for the inside telescoping section of the standard, the entire unit has an attractive black crackle finish, and is furnished completely wired and ready for operation.

Metal Paint Primer

TURCO PRODUCTS, INCORPORATED

Turco Products, Incorporated, 6135 South Central Avenue, Los Angeles, California, has developed a new paint primer said to assure permanent adhesion on galvanized metal with no chipping or peeling.

Through chemical action this paint displaces the slick, oily surface typical of galvanized metal with a roughened, "toothy" surface to form a tight bond with the paint. It also neutralizes the alkalinity and passivates the metal, forming an inactive film which will not become alkaline and which is resistant to corrosion.

Another feature, color control, results in a dark tint on areas properly treated, leaving the untreated area conspicuously bright, making it possible to determine

GE Welder's Spotlight

almost instantly which sections have been covered with the paint.

Application is by hand or by tank immersion. When applied by hand, the paint is wiped on full strength, or diluted with water, with a sponge or rag. When the proper color develops, surplus liquid is squeezed off and the surface wiped with clean, dry cloths.

Industrial Thermometer

C. J. TAGLIABUE MANUFACTURING COMPANY

C. J. Tagliabue Manufacturing Company, Park and Nostrand Avenues, Brooklyn, New York, has a new industrial thermometer, features of which include a plastic case front, yellow back, easy-reading thermometer tubing and malleable iron back.

By using a plastic case front, weight is reduced. The front is not affected by the temperatures to which the case is subjected under actual service conditions. Either the glass or the entire front can be replaced at nominal cost.

Yellow back lens front thermometer tubing offers the best color contrast with the mercury.

Malleable iron has been found to be an entirely satisfactory substitute metal for the brass formerly used, and is fully protected against corrosion by a durable black finish.

Operation and Maintenance

Allis-Chalmers, Milwaukee, has published a new pocket-sized magazine, "Allis-Chalmers Operation and Maintenance Review."

Illustrated with eye-catching color cartoons, the publication aims to broaden interest in problems of wartime maintenance. It contains maintenance tips from Allis-Chalmers engineers, as well as timely articles on current trends for the shopman and the executive. It also invites an exchange of ideas on operation and maintenance from equipment users. The "Review" will be issued bimonthly.

Compressed Air Cooler

NIAGARA BLOWER COMPANY

Niagara Blower Company, 6 E. 45th Street, New York 17, New York, has perfected the Niagara Aero After Cooler for cooling compressed air or gases generated for industrial use.

This cooler uses the evaporated cooling principle to obtain lower temperatures and the new design gives greatly increased capacity in compact apparatus.

Air, drawn by a fan through a water spray across coils containing the compressed air or gas is the cooling medium and temperatures within 10 degrees of the wet bulb air temperature can be maintained.

Bethlehem Supply Company Opens Two Texas Stores

Bethlehem Supply Company has opened two new stores in North Central Texas. P. J. Ryan as store manager and field representative at Graham and H. F. Wright is in charge at Bowie. Both of these stores are under the supervision of M. C. Niblack, district manager at Wichita Falls.

Mid-Continent Pump Company Opens Store at Casper

Mid-Continent Pump Supply Company has opened a new store at 1621 East Yellowstone Street, Casper, with E. C. Dilgrade in charge of the Wyoming-Montana district and G. M. Murphy in charge of the store.

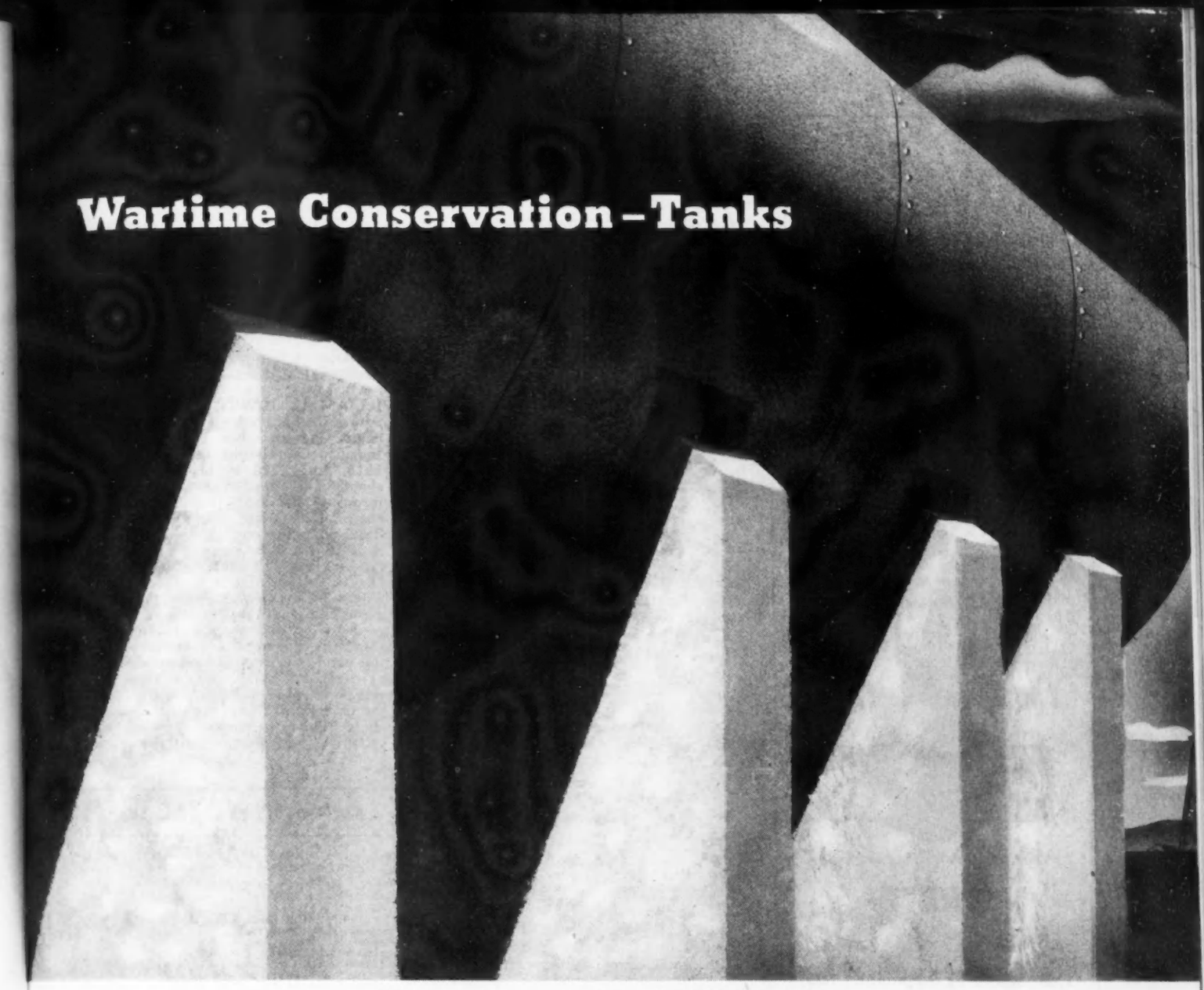
Belt Tension Control

American Pulley Company, Department 150, 4200 Wissahickon Avenue, Philadelphia 29, has published a 70-page handbook explaining the automatic belt tension control feature of American Econ-o-matic Drives. Elimination of belt slippage, increase of belt and bearing life, and reduction of drive maintenance are topics featured in the booklet. In addition complete selection tables, specifications and installation instruction are included on V-belt and flat-belt drives.

Speed Prime Pumps

Chain Belt Company, 1600 West Bruce Street, Milwaukee, Wisconsin, has published a new catalog descriptive of Rex speed prime pumps. The catalog contains information concerning the mechanical parts and construction of the pump, how the pump operates, and what it will do.

SAMUEL D. LUNT has been elected a member of the board of directors of The Wickwire Spencer Steel Company. He is the managing partner of the firm of Hamlin & Lunt, Buffalo, New York, stock brokers, and has long been associated in the banking and stock brokerage field. He has successively been connected with the Bancamerica-Blair Corporation, New York; Liberty Share Corporation, investment affiliate of the Liberty Bank of Buffalo, and with Birge, Wood & Trubee.



Wartime Conservation—Tanks

Information supplied by the "Oil Weekly"

Tankage for the necessary operations and handlings of petroleum between the well and eventual distribution points is becoming scarcer and increasingly hard to get. Old tanks, formerly considered suitable only for scrap metal, are being reconditioned and set up in locations where reduced wall thicknesses through rust and wear do not constitute a hazard at normal working pressures.

Protection of such thin-walled tanks at areas where they are supported is necessary if they are to continue in service under loading and expansion stresses.

Half-soling or shoeing such horizontal, cylindrical tanks, especially on the areas normally contacting the concrete or brick arched saddles on which they rest, provides additional metal to withstand the accelerated wear there, and absorbs or dissipates the concentrated stress frequently occurring at the corners or edges of the saddles as the tank changes shape under the weight of increasing fluid contents.

Coating the half-soles with two or more applications of asphalt or asphaltic paint prevents bond between steel shoe and concrete when the pier or saddle is cast, and also provides an insulating surface which absorbs tank shifts.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

ARMY E NAVY

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More than ever before you need valves that can "take it."

ORBIT VALVES

Orbit Wing Valve (Screwed End)

ORBIT WING VALVE

This valve is especially designed for Wing Service. Made in 2" size only in both flanged and screwed ends. Opening through valve is 1⅛". Seats of cast Stellite J Metal.

●

YOUR ORBIT VALVES

will last for the duration. Meanwhile, if you have any questions regarding their care or maintenance, write us.

●

OIL WELL IMPROVEMENTS CO.

SINCE 1912

TULSA, OKLAHOMA

Men in the Industry's News

H. B. STEARNS, Shell Oil Company scout at Ardmore, has been transferred to Wichita to succeed A. E. Palmer.

A. C. LEWIS has been appointed vice-president in charge of sales for Templeton, Kenly & Company, Chicago, effective January 1. He will make his headquarters in Chicago. He has been with the company most of the time since 1912, and has spent many years as a representative of his company in Canada.

E. G. RALL, 77, president of Whaley Company, Inc., West Texas producer, and director of Texas Pacific Coal & Oil Company died December 18 at Fort Worth.

LESTER T. POTTER. production engineer for Lone Star Gas Company, was chosen president of the Petroleum Engineers' Club of Dallas, succeeding C. H. Sanders of Cooper-Bessemer Corporation. Other officers elected are: W. J. Jackson, Lane-Wells Company, first vice president in charge of programs; H. C. Laird, Otis Pressure Control, Inc., second vice president in charge of entertainment; Charles G. Unlaub, C. G. Unlaub Company, third vice president in charge of membership. J. W. Black, Magnolia Petroleum Company, was re-elected secretary-treasurer.

PAUL REEVES has been appointed advertising manager for The Timken Roller Bearing Company, Canton, Ohio, to succeed R. P. Kelley, resigned. Reeves attended Staunton Military Academy and is a graduate of Carnegie Institute of Technology with a degree in Mechanical Engineering. He joined The Timken Roller Bearing Company in 1929 and after completing the company's engineering training course served as sales engineer at Chicago. He subsequently was made industrial district manager of the company's San Francisco branch. In 1940 he returned to Canton as sales promotion manager, but when this country entered the war, he was put in charge of government priorities to handle contracts between the company and Washington.

D. M. BRADLEY has been named vice president in charge of sales for Bovaird Supply Company at Tulsa, succeeding S. J. Raphel, resigned.

F. M. WILSON has recently been appointed North Central Texas representative for Weatherford Spring Company, with headquarters at Wichita Falls, Texas. He was formerly with Decker Tool & Supply Company for more than nine years, but more recently he has represented oil field specialty manufacturers in Texas.

D. R. KNOWLTON, director of production, PAW, is taking an indefinite leave of absence.

DR. S. H. KNIGHT, department of geology, University of Wyoming, will discuss "The Physical Evolution of the Rocky Mountains" in a series of four lectures to be given before Oklahoma geological societies during the early part of 1944.

WILLIAM G. IRWIN, one of the key figures in the development of the Diesel engine industry, died December 14, in Indianapolis. During the last war, in 1918, Irwin had in his employ, as a chauffeur, a young man whose ambition it was to develop a high speed Diesel engine suitable for trucks, buses, small boats and other types of mobile equipment too small to accomodate the larger type engines. The young man's name was Clessie L. Cummins. Irwin became convinced of the soundness of the young man's ideas and gave freely of his encouragement and financial backing. The Cummins Engine Company grew from this early association. Irwin was chairman of the board of directors of this company and was continuously active up to the time of his death. He participated in many industrial, financial, political, educational, religious and philanthropic activities.

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